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## ELECTRIC-VEHICLE CONVENTION.

The third annual convention of the Electric Vehicle Association of America, which took place at Boston last week and is reported elsewhere in this issue, marks another milestone in the progress which is being made by the electric vehicle. Since the establishment of this association the use of the electric vehicle has been greatly extended, and while it is impossible to say how much influence the Association has had upon this growth, there can be no doubt that its influence is being felt. The attention of central-station managers especially has been drawn to the possibility of obtaining a profitable load from this source, and the advertising campaign of popular education which is being conducted by the Association is no doubt having its effect in making the many advantages of the electric vehicle more widely realized. It is hard to judge the value of this form of advertising, but it is quite certain that its effect is cumulative in nature, and it is to be hoped that the Association will see its way clear to continue along this line of effort.

The Boston convention was very successful from every point of view and the attendance was large. Great interest was shown in the matters under discussion and the determination of the membership to accomplish something and make the influence of the Association felt is evidenced by the resolutions which were passed. It may fairly be said that the emphasis in the convention was placed upon the commercial truck. This vehicle is forging rapidly ahead and has a recognized place in meeting the transportation problems of our cities. Its use is rapidly increasing and it forms the most promising field for the attention of the central-station manager who is looking for additional business. In the words of Mr. Michel "The days of the horse are not numbered but past." The significance of such a statment is realized by those who have been closely following developments in this line. For those who have not, reference to the paper by Mr. E. S. Foljambe will be interesting and instructive. Attention was called last week to the question of fire risk, brought up by the paper of Mr. Carl H. Clark. Many of the other papers are deserving of special comment, for which space cannot be taken here. Suffice it to say that much valuable information was brought forward at the convention, and interesting discussion ensued.

## A USEFUL MOTOR-VEHICLE RESEARCH.

Central stations and other organizations interested in the development of the electric vehicle will welcome a second bulletin on the cost of motor trucking, which was presented by Messrs. Pender and Thomson, of the Massachusetts Institute of Technology, at the Boston convention. The expense of this work, as our readers know, has been defrayed by the Boston Edison Company, with the object of securing authoritative statistics upon the cost of both gasolene and electric motor traction upon highways, besides collating data upon the performance of horse-drawn vehicles. It is doubtful if the company could in any other way have chosen a better method of advancing the electric-vehicle industry, and for the reason that the gathering and interpretation of data by impartial workers in the research field offers the best means of establishing figures drawn from practice upon a sound basis for future deductions.

An examination of the data secured and published thus far discloses the need, however, of still further researches in this field before the central-station solicitor interested in the electric vehicle can confidently predict costs of operation and maintenance in specific cases. The authors of the report have in no sense claimed to present data for accurate estimates or for exhaustive analyses of service possibilities, but they have certainly made a most useful beginning in getting some actual figures from commercial practice into line for the general guidance of workers in this field. They have taken from the records of operating establishments the cost of tire renewals, battery maintenance, repairs, energy consumption, fuel requirements, lubricants, insurance and sundries for commercial trucks of capacities from 600 to 14,000 pounds, specifying the general character of service and roads traversed in each case, and giving the periods over which the figures were taken. As might be expected, the figures for machines of the same size vary widely according to the service rendered, but they are at least suggestive as setting before the student of electric and gasolene trucking certain limits attained in practice, and are therefore of no small value despite the individual variations encountered. In other words, the research has placed the whole subject of motor-vehicle service upon a quantitative plane, and has given the central-station engineer lines along which he can safely work in dealing with a class of business which in the past has been in a chaotic condition as regards reliable data.

Among the more interesting data presented in the bulletin, which will be sent gratis by the Institute within a short time to anyone interested in motor trucking, are figures of energy consumption for various sizes of electric vehicles in wholesale and retail delivery and trucking service. The 1,000-pound wagons covered were largely engaged in retail delivery or central-station installation work, and these averaged from 400 to 500 watt-hours per car-mile on rolling or hilly thoroughfares, the records ranging from 7 to 32 months, and including about 9 representative machines. The 2,000-pound electric trucks averaged 762 watt-hours per car-mile in records of 8 to 17 months, the range of the 11 vehicles being from 485 to 1,015 watt-hours per car-mile. Passing over the intermediate sizes, it is suggestive that the 7,000-pound electric trucks, three in number and covering records of from 15 to 26 months, required from 1,110 to 1,329 watt-hours per car-mile, and that four 10,000-pound "battleships," recorded for 12 to 15 months, consumed from 1,034 to 1,500 watt-hours per car-mile in trucking service. With these machines the cost of repairs ranged roughly from 3 to 7 cents per mile, battery renewals from about 1.5 to 7 cents, and tire renewals, usually from 1 to 3 cents. The nature of the loads carried, daily mileage, number of stops per day, speed control, system of routing, garage facilities, road surfaces and many other factors were no doubt responsible for the variations in the complete data presented.

## CONCERNING THE SERVICE CUTOUT.

During the last year or two electrical inspectors in some localities have been more or less disturbed over the fire hazard which may arise from improper construction where the service wires from an overhead line are run in conduit. Short-circuits and grounds in service pipes where these extend some distance within the building before entering the service cutout cabinet have started fires, and this caused certain inspectors to feel that fuses should be installed at the outer end of the conduit. It will be recalled that this matter came before the Electrical Committee of the National Fire Protection Association at its Boston meeting last spring. The Committee decided that the best thing to do was to insist upon the service fuse being located at the point where the wires come into the building instead of at some other place which the contractor or the property owner might consider more convenient.

There is, however, another bad practice in connection with conduit services which should be corrected. This consists in running the conduit in the wall of the building itself. In certain types of structures there is sometimes a long run of pipe between the laths and plaster, on one side, and the outside of the wall on the other, from the point where the service wires reach the building down to the cabinet in the basement. The wires in this pipe are without fuse protection, of course, except such as is afforded at the transformer or other source of current. While the hazard arising from such construction as this may not be very great, the possibility of a fire starting in such work must be recognized. The conduit should be run on the outside surface of the wall to a point as nearly opposite the cutout as is practicable and be carried into the building there; or, where the construction of the building will permit it, the pipes may safely be imbedded in the outer masonry of the wall.

## THE NEED OF LOCAL ORGANIZATION.

To indulge in generalities concerning the benefits of co-operation is a comparatively easy matter always. In almost any sort of undertaking, be it of an industrial or even of a social nature, the exercise of the spirit of mutuality and concerted effort in a common direction on the part of all those concerned is generally so obviously desirable that argument in favor of it may be found without difficuty. But when it comes to advising and putting into operation practical, effective means of insuring the desired co-operation, difficulties, to overcome which great patience and skill are necessary, are liable to arise.

One of the things most needed now in the electrical field is greater local organization among the electrical contractors in the various cities and towns of the country. In not a few of these the contractors feel, and not without cause, that the central station is doing more or less business which should be left wholly to them. Moreover, to say nothing of the unfortunate jealousies which may exist among the contractors themselves, there may be misunderstandings between these and the local inspection departments which are annoying to all concerned and expensive to the contractor.

A most effective way of relieving such conditions as these is for the contractors in a town to come close together in a permanent living local association. A town is rarely so small and the contractors so few that matters of general policy among central station, inspectors and contractors can be satisfactorily adjusted by individual dealing. The central station is well represented as a rule by its manager; the inspection department by its chief; and the contractors should be represented through a local association by a committee having the authority to speak for it.

An interesting bit of evidence of the correctness of the foregoing argument is seen in the relations existing between the contractors and the inspection department in the city of Chicago. There are two contractors' associations in that city, the Faraday Electrical Association and the Electrical Contractors' Association of Chicago. When the inspection rules were to be revised last spring the chief inspector of the city invited these associations to appoint representatives to consider that matter with the representatives of the Board of Underwriters and the central station. The result was that the revisions are generally pleasing to everybody concerned. In no other way, perhaps, could such a result have been obtained.

## THE SIZE OF MAIN LEADS.

An interesting question is raised on page 755 of this issue regarding the size of mains which should be installed to supply given branch circuits. The answers there given indicate that it is not within the inspector's province to specify the size of main which shall be used, but only to see that the circuit is fused to correspond to its capacity.

The question still remains as to what size of wire should be installed by the contractor when the specifications are not definite on this point. While branch circuits are limited to six amperes on 110-volt lines, it is not necessary to assume that every branch circuit will be loaded to this maximum capacity; the contractor should preferably determine the intended load to be connected to each branch and install main leads of size sufficient, according to the load rating, to carry the combined loads of all the branches. To provide a lesser carrying capacity on the assumption that all of these loads will not be carried simultaneously, is to lay up trouble for the owner of the premises. For when such a load comes to be applied and a fuse is blown, he must cut off a portion of the load, overfuse the main circuit, or have the premises rewired.

The contractor who puts an owner in this position must be regarded as skimping his work. And while it may not be technically proper for the inspector in such a case to refuse approval to the installation, it will be at least in order for him to notify the owner of the inadequacy of it.

## SQUEALING OF CAR WHEELS.

The irritating screech which is so often emitted by car wheels, especially after the brakes have been applied, is a familiar phenomenon to us all; but it is not generally known to what this is due, nor how easily it can be avoided. If it were, there would no doubt be a large crop of municipal ordinances intended to obviate the nuisance. Now that the cause is known and remedies available, electric railway companies should not wait for municipal action or a public hue and cry before doing away with the objectionable noise.

This matter came up for consideration at one of the sessions of the American Electric Railway Engineering Association, the report of which will be found elsewhere in this issue. A committee has been investigating the matter, and, moreover, experiments made by other parties have located the trouble and discovered how it may be overcome. It appears that the noise is produced partly by the sliding of the brake shoe on the wheel and partly by the grinding of the wheel flange against the rail. Both of these take place especially after the brake shoe grips the wheel upon application of the brakes, and the squealing is especially noticeable with steel wheels. The remedy is to apply lubrication at the surfaces where the vibration is set up, and this is conveniently done by means of an insert in the brake shoe, the material used being one which will not decrease the coefficient of friction to an objectionable extent. Such a remedy not only eliminates the ear-splitting noise, but reduces the wear on wheel flange and rail. With a remedy so simple, its application should be general and quick. Exit the car-wheel squeal!

## Program of Illinois Convention.

The annual convention of the Illinois State Electric Association will be held at Peoria on October 22, 23 and 24.

The first session will be held on Tuesday afternoon, at which papers will be presented by Albert S. Scott on "Central-Station Accounting," and by H. B. Gear on "High-Tension Distribution in Northern Illinois."

On Wednesday morning the following papers will be presented: "Series Tungsten Lamps for Street Lighting," by Arthur J. Cole. "Making Ice with Central-Station Power," by J. R. Cravath. "The Electric Vehicle as Central Stations Should View It," by George H. Jones.

The program on Wednesday afternoon consists of a symposium on campaigns for new business, in which the following will take part: George E. Fuller, "Electric Signs;" W. F. Hansgen, "Ornamental Post Lignting;" H. C. McMillan, "House Wiring;" C. L. Owen, "Merchandise Sales;" D. Davis, "How to Increase the Power Load in Small Central Stations;" W. F. Crossley, "Electricity for Irrigation and Drainage;" L. H. Haynes, "Street Lighting and Pumping for Cities and Villages;" C. F. Snyder, "Window Lighting."

On Thursday morning Henry J. Frith will present a paper on "The Practicability of Central-Station Heating," and H. W. Young will speak on "Recent Developments in Electric Meters." Ernst J. Berg, professor in the University of Illinois, will make an address also.

On Thursday afternoon there will be an executive session.

R. S. Wallace is chairman of the Committee on Arrangements, and the secretary is H. E. Chubbuck.

## Railway-Headlight Tests.

At a joint meeting of the Western Railway Club and the Chicago Section of the Illuminating Engineering Society held in Chicago on October 15, C. M. Larson presented a paper entitled "Headlight Tests." This gave the results of extended visual tests of several electric, acetylene and oil locomotive headlights in which observations were made on the distance that objects or obstructions could be observed and the accuracy with which signals could be read. It was found that the more powerful headlights illuminated the track much farther than any oil headlight but frequently gave erroneous or phantom aspects to signal lanterns. The paper pointed out that the number of electric headlights in service is very large and steadily increasing and, despite the indications of the tests, these headlights are very successful in actual service and have not caused any increase in accidents.

## Educational and Welfare Work of the New York Edison Company.

The education of employees has become a permanent factor in the successful management of many industrial corporations. To be of most value instruction should cover the particular kind of work carried on by the company. It should prepare employees to assume greater responsibilities, increase their knowledge and efficiency, give them the opportunity of becoming better informed about the work of the positions ahead of them, and increase their loyalty by convincing them that their company is interested in their welfare and success.

In The New York Edison Company educational facilities are offered through an Educational Bureau and the Educational Committee of the Association of Employees. This Committee has prepared technical and accounting courses, in both of which attendance is voluntary. The commercial courses prepared by the Educational Bureau, however, are recognized as part of the routine work of the commercial department, and instruction is given on the company's time. Employees enrolled in these courses are required to attend each session unless excused.

The purpose of the commercial courses is to carry out in a practical way the new gospel of "greater efficiency." First, by rendering the public the best possible service; second, by increasing the individual efficiency of the company's employees. The New York Edison Company recognizes that employees, particularly those who meet the public, must be able to answer questions and qualified to give advice on any reasonable matter within the scope of the company's business.

The New York Company is perhaps the first electrical company to undertake a work of this kind among its employees.

## The Wireless Ocean Letter.

The Deutsche Betriebsgesellschaft für Drahtlose Telegrafie, commonly known in English as the Telefunken Wireless Telegraph Company, has inaugurated the "ocean letter," a new delayed wireless-telegraph service. The method is as follows: an outbound traveler on a German vessel, wishing to communicate with friends or business connections at home, writes a letter of 30 words or more, which is transmitted by wireless from the vessel on which the traveler is to the nearest homeward-bound German vessel, where it is reduced to writing, placed in an envelope, and mailed when the vessel first reaches port.

The service, which was tried first on the steamers of the Hamburg-American Line plying to and from South America, is now being extended to the entire German merchant marine. According to the present arrangement the vessels of no other nation participate in it. The charge is 5 marks ($1.19) for the first 30 words, address counted, and 10 pfennigs (2.4 cents) for each additional word. There is a further charge on each message of 50 pfennigs (11.9 cents) for postage and conveyance.

## Use of Ozone for Purifying Water in European Cities.

United States Consul General A. M. Thackara, stationed at Berlin, reports that ozone works for the sterilization of drinking water have been erected in the following European cities: Wiesbaden, Paderhorn, Hermannstadt, and Chemnitz, in Germany; Paris, Nice, Chartres, and Dinard, in France; Florence, in Italy; and St. Petersburg in Russia. Eminent authorities agree that the plants in those cities are working satisfactorily.

The process of ozonization effects a complete destruction of all bacteria of typhoid, cholera, and dysentery that may be contained in the water. At the same time it is claimed that the number of so-called innocuous bacteria in the water is considerably diminished.

The ozonization process may also be used on a small scale where sterilized or chemically pure water is desired. Portable apparatus is made in Berlin that can be used for the sterilization of drinking water intended for soldiers while in the field. Machines are also constructed for the ozonization of water in ice plants, in breweries, on board ship, etc.

A representative of a large concern manufacturing ozone apparatus claims that under ordinary conditions the approximate cost of sterilizing water on an extensive scale is about one-fourth cent per cubic yard. This estimate, however, refers only to the cost of operation after the plant has been installed. Experience up to the present time has demonstrated that the cost of ozone sterilization, inclusive of the preliminary filtration, is 1.6 to 1.8 pfennigs per cubic meter (about one-half cent per cubic yard), of which amount the ozonization process itself costs the city approximately one-half.

## Electric Club of Chicago Hears About Lincoln.

At the regular noonday meeting and luncheon of the Electric Club of Chicago, at the Hotel Sherman, Thursday, October 10, Daniel W. Church, a prominent Iowan and an attorney, made a very enjoyable address on "The Idea and Vision of Abraham Lincoln."

# Convention of American Electric Railway Association.

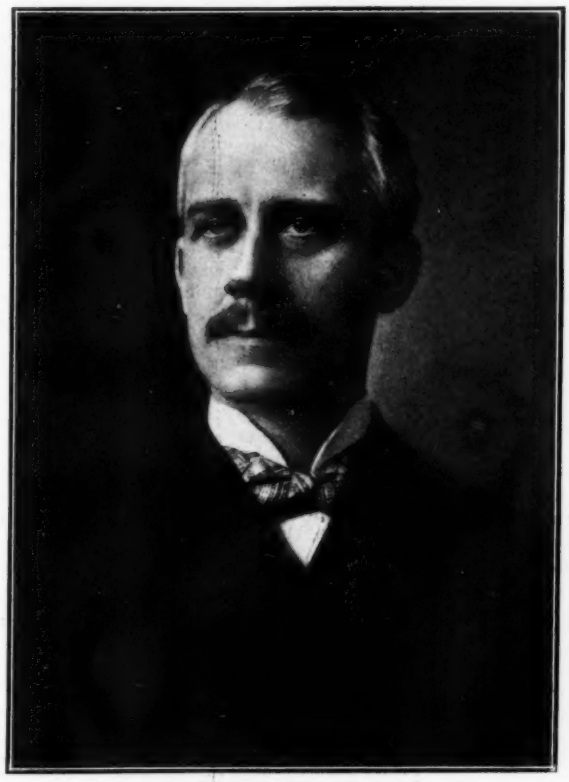
## Report of Annual Meeting in Chicago of Association and Affiliated Organizations.

The thirty-first annual convention of the American Electric Railway Association and its affiliated organizations, representing the Accountants', Engineering, Claim Agents' and Transportation Associations, was held at the Union Stock Yards, Chicago, Ill., October 7 to 11. The meetings were held in the various rooms of the Saddle and Sirloin Club, and the exhibit of the American Electric Railway Manufacturers' Association was held at Dexter Pavilion, the track exhibits occupying the ground space between.

In point of attendance, business accomplished, and extent of the exhibition the meeting was highly successful. Over 4,000 delegates, guests and manufacturers' representatives registered during the week.

Meetings were held from Monday until Friday, the sessions of the American Association all being held in the afternoon, so that all in attendance might have an opportunity of attending the meetings of the parent association.

The first meeting of the American Association was called to order Tuesday afternoon at 2:45 o'clock. In the absence of President T. W. McCarter, president of the Public Service Railway Company, Newark, N. J., the first vice-president, General George H. Harries, president of the Arkansas Valley Railway, Light & Power Company, Louisville, Ky., presided. Mr. McCarter is convalescing from an attack of typhoid fever.



George H. Harries,
President-elect, American Electric Railway Association.

### The President's Address.

C. Loomis Allen, president of the Newport News & Old Point Railway & Electric Company, Syracuse, N. Y., was called upon to read the president's annual address in the absence of Mr. McCarter. This address reviewed the work of the Association during the year, calling attention particularly to the trip of the executive officers lasting from April 17 until May 30, visiting member companies in the South, the West and the Pacific Coast. The thanks of the Association are due to the Manufacturers' Association for its thorough cooperation and its generous financial support in contributing to the success of this trip. Visits were had with heads of companies, municipal authorities, civic bodies and prominent citizens. The results of this trip will go far toward solving many of the problems arising in the relations of the public-utility companies with the public they serve. The report discussed briefly the inauguration of the Association publication, *Aera*, and endorses the formation of company sections. Attention was also called to the throwing open of all the meetings of the American Association and the building up of the organization through its associate membership. Mr. McCarter also pointed out the advisability of having a permanent representative of the Association located within the city of Washington, D. C., where he may closely watch the proceedings of Congress as they may relate to interstate commerce acts affecting any portion of the membership.

### The Secretary's Report.

H. C. Donecker, secretary of the American Association presented his report showing that despite the great amount of work carried on, the bank balance totals very close to the sum in hand at the close of the year 1911. The income of the Association has now reached the $50,000 mark, and its balance is more than $17,000, showing that it has reached a position of stability that will carry with it a broader scope in future years. The expenses in the year just closed have naturally increased somewhat, without considering the amount due to the trip of the executive officers. Eliminating this charge, which amounted to approximately $4,750, an equal amount having been paid by the Manufacturers' Association, the expenditures have increased in the neighborhood of $5,000. The increase is accounted for mostly by the great increase in printed proceedings and advance papers, which is responsible for one-half of the additional outlay, or rather $2,300. Another item is the expense of publicity work carried on in connection with the convention at a cost of $500. This year has seen also much greater activity on the part of the committees of the parent association, and this, in connection with expenses due to having had representation at Washington at various hearings, is responsible for $750. The balance of the increase is due to salaries, which this year total some $1,300 more than in 1911. These figures approximate the $5,000 difference between the total in 1911 and that in 1912, excluding the expenses of the trip. On September 30, 1912, there were 2,557 individual members in good standing, and 393 company members. The receipts, during the fiscal year ended September 30 were $50,662.53; the total including balance of October 1, 1911, $68,589.33. The expenditures for the fiscal year ended September 30, 1912, were $50,955.12, leaving a balance on hand of $17,634.21.

### Invitation from San Francisco for 1915.

An invitation from representatives of electric railway interests and the Panama Exposition Company to the Association to hold its 1915 convention in San Francisco was referred to the Executive Committee. W. W. Briggs, of the

San Francisco-Oakland Terminal Railway, urged early consideration in order that proper arrangements might be made to effect the best possible assignment of space and quarters to take care of the convention.

### Welcome to Chicago.

George B. Caldwell, vice-president of the Continental & Commercial Trust & Savings Bank of Chicago, welcomed the convention to the city. He congratulated the men before him upon their reputation for directness of purpose, and their desire to be in the forefront in the rendering of adequate service. In Chicago, under careful financing and proper operation there had been a rehabilitation not only of the securities invested in the properties, but in the sentiment and sympathy of the public served.

The report of the committees on Subjects, Company Membership, and Individual Membership were presented. The work of the committee on active or company membership resulted in a net gain of 28 over the number enrolled at the beginning of the year, despite the fact that a loss of 10 members was sustained by consolidations and a few withdrawals.

### Water-Power Development and Its Relation to Public Utilities.

A paper, entitled "Water-Power Development and Its Relation to Public Utilities" was presented by James E. Hewes, of H. M. Byllesby & Company, Chicago. Mr. Hewes reviewed the advantage to humanity of the development of water power in its broadest sense to curtail the damage now involved in the flooding of large areas adjacent to navigable streams. During the past year the damage arising from floods in the United States exceeded one hundred millions of dollars. He urged the formation of a commission to study the best means of establishing water powers on navigable streams. This commission would do more in making available to citizens of the United States energy at a low price and reducing the cost of industrial operations than any institution yet constituted for the conservation of our national resources. He especially pointed out the flood damage annually visited upon the Mississippi Valley, and suggested that the great organization of the Government now at work upon the Panama Canal be used for the development of improvements on the Mississippi River.

A resolution of congratulations was extended to J. M. Roach on the completion of his 40 years of service as a railroad man.

### Second Day's Session—Education.

In the absence of the chairman of the Committee on Education, the report was presented by Professor A. S. Richey. This report reviewed the efforts made by the committee to secure uniformity of action in the establishment of a system of apprentice instruction and rehearsed the plans for carrying into practical effect the suggestions of the committee. The membership, however, has not expressed itself in such a way as to justify the carrying out of these plans at present, and the committee recommends that the Association expend, say $500, in having a representative personally visit a number of important centers and explain the plan to officers and men in order that this matter may be put on a full trial.

The report was referred to the Executive Committee.

### Insurance.

The report of the Committee on Insurance was presented by E. J. Cook. This report was accompanied by a report from the Association's insurance expert, Henry W. Staats. The work of the committee has brought about:

(1) A closer relationship and a better understanding between the committee and the managers and other officers of the large stock insurance companies.

(2) The recognition by the factory mutual insurance companies of protected railway properties as desirable risks and actual insurance by them of a number of traction properties.

(3 A start toward the drafting of standard rules and requirements for the construction and protection of car houses and other railway structures to take the place of the three sets of rules and requirements now in effect, viz., those of the National Board of Fire Underwriters, as recommended by the National Fire Protection Association, and those of the Central Traction & Lighting Bureau.

Mr. Staats reported that the most important work accomplished in the year is that of interesting the factory mutual insurance companies of New England in traction and lighting properties. The executive officers of a number of the factory mutual companies made personal inspections of traction and lighting properties and decided that, when protected in accordance with the well-established rules of the factory mutual companies, the properties average up with the class of risks now insured by them. As a result of these inspections a large number of traction and lighting properties have been taken over by the factory mutual companies, and other properties will be considered by them for insurance when protected in accordance with the plans and specifications of the insurance expert's office.

### Company Sections.

The report of the Committee on Company Sections was presented by C. N. Duffy, Milwaukee. Three kinds of company sections are proposed: (1) a strictly company section, devoted entirely to men employed in the electric railway business; (2) a joint company section organized by a member company desiring or having a company section in some similar association, like the National Electric Light Association; (3) a combined company section, where the members from one company would not be strong enough to effectually carry out the work. The committee recommended that the executive committee give annually a gold medal for the best paper presented at a company section meeting, by a member, dealing with the electric railway business. Three company sections have been organized, as follows: Milwaukee Electric Railway & Light Company, Milwaukee; Public Service Electric Railway Company, Newark, N. J.; Denver City Tramway Company, Denver, Colo. Company sections are being organized as follows: Kansas City Railway & Light Company, New York State Railways, Pittsburgh Railways Company, San Francisco-Oakland Terminal Railway, South Carolina Combined Company Section.

In the discussion that followed the fact was brought out that there are 335 members in the Public Service Company's section. For members receiving $60 a month the company pays half the dues. So far as class of members is concerned the membership is at present composed of employees of the grade of inspector up.

The report of the *Aera* Advisory Committee was presented by A. W. Brady, and referred to the incoming executive committee.

### Changes in Constitution and By-Laws.

The report of the Committee on Constitution and By-Laws, Charles S. Sergeant, Boston, chairman, was presented by the secretary, and ordered filed. The committee recommended that in the future the two classes of members be known as follows: Companies as "company members;" individuals as "members." It proposes the following revision of the constitution and by-laws:

"111. The membership of this association shall consist of two classes, as follows:

"(a) Company members, consisting of American urban and interurban railway companies, or lessees, or individual owners of urban and interurban railways, or steam railways having electrified sections. Each company member shall be entitled to one vote, which shall be cast by the properly accredited delegate.

"(b) Members, consisting of individuals, co-partnerships and corpora-

tions which are actively identified with urban and interurban railway interests, or with those of steam railways having electrified sections, and other persons who, in the opinion of the executive committee, have had experience of such a nature as to render desirable their connection with the association. Members may ally themselves either directly with the American Association or with its Engineering Association, its Claim Agents' Association or its Transportation and Traffic Association, provided such membership conforms to the constitution and by-laws of the designated organization. Only those eligible, as determined by its executive committee, to the executive sessions of the American Association conventions may be allied directly with the American Association. Excepting that they shall not be entitled to vote or hold office, the privileges of the members shall be similar to those of the company members, and, in general, these privileges shall be as follows:"

The report of the Committee on Relations With Sectional Associations, was presented by C. L. Henry, Indianapolis, chairman. This report referred very briefly to the general satisfaction with which the work of the sectional associations is going on. C. L. S. Tingley reported that the officers of Pennsylvania State Association were in favor of closer relations with the American Association.

### Public Relations.

The report of the Committee on Public Relations was presented by A. W. Brady, Anderson, Ind., chairman. The report referred to the improvement in many respects of the relations of public utility companies with their public and the overcoming of misconceptions and prejudices. He referred especially to the trip made by the officers of the association during the year and to the association publication as two important developments in the right direction.

### Publicity.

A paper entitled "A Policy of Publicity," by Arthur Warren, was read. This paper discussed the necessity of co-operating closely with the daily press in making available proper news matter that would give the public needed information upon many of the problems of the railway business. This can not be done by the individual companies. It must be handled by some person, familiar with newspaper work, acting as an officer or committee or the spokesman of the association. The association has declared in favor of publicity, but has only upon a few occasions taken advantage of opportunities for publicity. The cost of an organized effort would not be high, Mr. Warren believing that a good start could be made upon the expenditure of $10,000 for the first year.

### Welfare of Employees.

The report of the Committee on Welfare of Employees, was presented by J. J. Burleigh, chairman. The report covered in detail many phases of the subject. Many employers now feel that welfare work has an economic value which increases in direct ratio with the spirit of humanitarianism which marks its operation. From whatever angle the matter is studied the results appear to be satisfactory. The report was discussed by Mr. Burleigh, R. B. Stearns, F. W. Hild, E. T. Munger, C. S. Tingley and D. A. Hegarty. The consensus of opinion leaned to the value of welfare work when properly carried on in making the men more and more loyal to the company.

An address entitled "Arbitration in Australia" was made by J. S. Badger, manager of the Brisbane Tramway Company, Queensland, Australia. Mr. Badger pointed out the very unsatisfactory condition into which compulsory arbitration had fallen in Australia and indicated the unreliability of the employee there in living up to his agreements when the award of the court was not to his liking.

After a rising vote of felicitation to Mr. McCarter the meeting adjourned.

### The Final Session—Compensation for Carrying United States Mail.

The report of the Committee on Compensation for Carrying United States Mail, was read by T. H. Tutweiler, Memphis, Tenn., chairman. The committee recommended a considerable increase in the rate of compensation to electric railways, and upon conference with the Federal committee on post offices and post roads was well received. More information relating to revenue received by electric railways is necessary and the full co-operation of member companies is urged. With the matter properly presented the committee feels that recommendations for legislation for increased compensation will be secured.

This report was discussed by Mr. Tingley, J. McMillan and Mr. Tutweiler.

### Taxation.

Mr. Tingley presented the report of the Committee on Taxation. The committee sent letters to 47 members, and the 39 responses show that taxes are assessed under general law in fourteen states, under special laws in twenty-one states, and under both general and special laws in four states; by state boards in twenty-one states, by local assessors in seven states and by state boards and local assessors in eleven states. They show further that gross receipts are taxed in eleven states, that net receipts are not taxed in any state, that capital stock is taxed in eight states, that bonds are taxed in four states, that other loans are taxed in three states, that tangible property is taxed in twenty-one states and that the property as a whole is taxed in seventeen states. That municipalities have power (whether exercised or not )to tax gross receipts in twelve states, to tax net receipts in five states, to tax capital stock in two states, to tax bonds in one state, to tax loans in one state, to tax tangible property in seventeen states, to tax the property as a whole in seven states, to require paving in thirty-seven states, to levy car licenses in twenty states, to levy pole licenses in sixteen states, to require street sweeping in eleven states, and to levy bridge licenses or taxes in fourteen states, and that in six states they have power to impose other special burdens or payments.

### Joint Use of Poles.

The report of the Committee on The Joint Use of Poles, was presented by W. J. Harvie. The committee reported progress of the most satisfactory kind, but owing to the fact that this subject involves so many interests great care must be exercised over every step. A committee has been formed representing the American Electric Railway Association, National Electric Light Association, American Institute of Electrical Engineers and the American Telephone & Telegraph Company. Most of the debatable points have been agreed upon and the few remaining ones are fast approaching definite settlement.

### Alleged Electrolytic Damage.

Calvert Townley, New York, submitted the following resolution *"Resolved*: It is the sense of this meeting that co-operation between this association and others concerned looking toward reduction in the disputes and litigation over alleged electrolytic damage is desirable." Mr. Townley said that there had been a lot of unnecessary disputes and notoriety attached to this matter. It had been suggested that a joint committee of all the interests involved be formed. If this committee were formed the association could be kept in touch with the proceedings through its representative. The resolution was adopted and referred to the incoming executive committee for action.

### Rates and Fares.

A paper by R. B. Stearns, vice-president, Milwaukee Electric Railway & Light Company, entitled "The Milwaukee Fare Case," and the report of the Committee on Determining the Proper Basis for Rates and Fares, were presented by C. N. Duffy. The paper by Mr. Stearns gave a study in detail of the many factors entering into the action of the Railroad Commission of Wisconsin in the application of the City of Milwaukee for a reduction in the rate of fare on city lines. The author an-

alized each step in the process of effecting valuations and the percentage of return upon each part making up the car service. He also draws many conclusions resulting from this study. One of these is that the street-railway business is the most hazardous of municipal public utilities, and as such is entitled to large rates of return upon invested capital than are necessary to attract investment in other classes of utilities. If the return be limited to seven and one-half per cent, only the necessity of preserving the investment already made will offer any justification for making further investments.

The Committee on the Proper Basis for Rates and Fares submitted memoranda to be distributed among the member companies for full examination and later discussion. It notes particularly the decision of the United States Government to establish a zone system in connection with the parcels post, which begins operation on January 1 next. In a business such as that of electric railways, where approximately 33.3 per cent to 40 per cent of the traffic is handled within three to five hours out of the 24, this representing practically the lowest load-factor of any public utility, and where the cost of living and consequent wages paid are increasing by leaps and bounds, it is essential that the present five-cent fare be limited in distance, and for the street railways of $5,000,000 annual gross earnings and less, it is apparent that the length of ride should not be over four miles.

**Electric Railway Securities.**

A paper entitled "Electric Railway Securities," was read by Morrell W. Gaines, statistician for Brown Brothers Company, New York. Mr. Gaines presented a lengthy study of the position of electric railway securities. These go to a discriminating class of investors, rather than to the generality. In intrinsic worth electric railway securities compare most favorably with those of the steam railroads. The earning power has the greater stability. The bonded debt is not relatively disproportionate to that earning power. The requirements for new capital outlay from time to time after a complete property is in full operation—requirements which not infrequently alter the entire financial outlook of steam railroads—are not so formidable. The technical management of electric railways has been vastly improved in the last 10 years. Investors are coming to have confidence in the care and the skill of the executives of the system whose size presupposes the employment of trained and experienced men. This confidence, in conjunction with the gradual improvement of the electric railway position, is responsible for the great success of the pioneer holding companies, a success which has brought into the field numerous imitators whose quality is yet to be proved.

A paper entitled "Automatic Rate Regulation, "by O. T. Crosby, was then presented. This was followed by an address by Andrew Cooke, of Cooke, Holtz & Company, Chicago, on public utility securities. These papers will be reviewed at length in a later issue.

**Federal Relations.**

For the Committee on Federal Relations, Vice-president Harries, as chairman asked leave to print, and submitted the report by title. In this report General Harries reviews in a most interesting and illuminating way the vast amount of investigation and research that has been thrust upon the Interstate Commerce Commission, the Commerce Court and other legislative commissions either appointed or projected. He concludes that while there should be no cessation on the part of the common carriers of efforts to secure from Federal legislators and Federal executives that fair dealing which must ultimately prevail, yet the scope of our missionary effort should be greatly broadened. The executive officials and the senators and representatives are, after all, merely the effects. The cause is the citizenship of the entire United States, and it is in the voting millions that the ruling power has its abiding place. Each member company should devote itself to sincere and assiduous educative effort throughout the area of its location and properly persuasive influence. Each man should reason with his neighbor. The ignorance of the individual should be displaced by that clear understanding which can come only as the result of at least a reasonable degree of personal knowledge.

**Election of Officers.**

The nominating committee presented the following nominations for officers and executive committee members for the ensuing year. Mr. Hegarty moved that the secretary cast the ballot and these were declared unanimously elected:

President, George H. Harries, president Arkansas Valley Railway, Light & Power Company.

First vice-president, Charles N. Black, vice-president and general manager United Railroads of San Francisco.

Second vice-president, C. Loomis Allen, president Newport News & Old Point Railway & Electric Company.

Third vice-president, C. L. Henry, president Indianapolis & Cincinnati Traction Company.

Fourth vice-president, John A. Beeler, vice-president and general manager Denver City Tramway Company.

Members of the Executive Committee, the officers of the affiliated associations.

General Harries made a characteristically happy little speech, voicing his appreciation, and after the presentation of the report of the Committee on Resolutions the meeting of the American Association adjourned.

## American Electric Railway Engineering Association.

The first meeting of the American Electric Railway Engineering Association was held on Monday afternoon. President E. O. Ackerman called the meeting to order and presented his annual address. He pointed out that the Executive Committee had selected for consideration only those subjects which were regarded as of the most importance and he advocated an increase in the number of members on committees in order that all important matters should be thoroughly considered. The Committee on Education of Engineering Apprentices was omitted this year on account of the press of work among those most interested. He suggested changing the name of this committee to the Committee on the Education of Mechanical Apprentices.

The report of the Executive Committee was then presented. It referred to the ineffectiveness of the method of adopting standards and suggested a change. The findings of a sub-committee on revision of constitution was included. These referred to the method of electing officers and the organization of the Association. It was suggested that the three vice-presidents be assigned respectively to Association and committee membership, publications and finances.

The president appointed the following Committee on Nominations: H. H. Adams, C. H. Clark, William Roberts, W. J. Harvie and J. M. Yount.

The report of the secretary-treasurer was presented by Norman Litchfield, and it was accepted.

The report of the Committee on Power Distribution was then presented by the chairman, George W. Palmer, Jr. The question of joint use of poles has been taken up by the Ameri-

can Association and was, consequently, not discussed. Specifications were suggested for overhead crossings of trolley contact wires over railway tracks and for crossings of foreign wires with electric-railway wires. The specifications for overhead crossings of electric light and power transmission wires were presented with slight revisions for adoption. This was done. The National Electric Light Association and the American Railway Association have, with very slight revisions, adopted these as recommended practice.

In discussing the joint use of poles, the point was emphasized that the poles should be perfectly safe and the recommendation of the Committee that there should be 15 inches of clearance on either side of the pole was adopted. It was brought out that this is opposed by the telephone companies, who wish to string cables directly on the pole, but the prevailing opinion was that this attitude is not justified. On the subject of high-grade rubber-insulated compound the Committee was working in conjunction with the Committee on Equipment, but no agreement had been reached. Discussion on this subject from C. F. Woods showed that in view of the work of other societies on this subject, the previous specifications could not be simplified but must be largely amplified.

The Committee recommended the adoption of the new copper-wire tables prepared by the Bureau of Standards and adopted by the American Institute of Electrical Engineers. These tables in slightly modified form are reproduced in the report. The standing table of the Bureau of Standards was also adopted.

The Committee advocated, as recommended practice, that trolley guards should not be used except in unusual cases. The discussion developed a great difference of opinion on this matter, and it was brought out that such guards were used with satisfaction in certain parts of the country, and are being made compulsory by the Ohio Commission. Consequently it decided to take no action upon this matter, which was referred back to the Committee. Slight changes were adopted in the specifications for high-tension three-conductor paper-insulated lead-covered cables and for single-conductor paper-insulated lead-covered cables for 1,200 volts.

### Joint Session on Block Signals and Train Operation.

On Tuesday morning a joint session with the Transportation and Traffic Association was held for the consideration of the report of the Joint Committee on Block Signals for Electric Railways, E. O. Ackerman and J. N. Shanahan occupying the chair. The report was presented by J. M. Waldron, chairman of the Committee. The report contains a digest of block-signal laws and rulings in the different states, and a summary of the data sheets showing block signals now installed and to be installed during 1912. The Committee recommended as standard practice (1) the use of three fundamental indications, stop, proceed-with-caution, and proceed; (2) semaphore signals indicating in three positions in the upper left-hand quadrant; (3) definite aspects in three-position signaling; (4) definite aspects in two-position signaling; (5) for high-speed interurban service automatic signals be controlled by the use of continuous track circuits and that expenditures, when limited, be concentrated on the latter. The discussion was quite lengthy, including descriptions of signal apparatus already in use upon several railways, and developed opposition to recommendation (5), which appeared to indorse automatic block signals. This recommendation was referred back to the Committee and the remaining recommendations adopted, (2) being amended to read "where semaphore signals are used they shall be so arranged as to indicate three positions in the upper left-hand quadrant."

The report of the Joint Committee on Train Operation was then presented by W. H. Sawyer. This report related only to city service and consisted of comparisons of single-car, multiple-unit and trailer-car operation both with two motors and with four motors. Costs were compiled on a 100-car basis for fixed charges, platform extensions, maintenance and inspection, and power. The Committee recommended that the subject of two-car train operation receive serious study and attention as a distinct saving can be made by this method during certain periods of the day.

In the discussion of this paper H. A. Johnson presented some figures for operation on the elevated railroads of Chicago. These showed a variation of 87.5 per cent in motor capacity per ton, with different numbers of trailers. Many of the trailers are equipped with motormen's cabs and controller apparatus for multiple-unit control. With this style of control equal numbers of motor cars and trailer cars was found most economical.

### Wednesday Session.

At the Wednesday morning session the first business was the report of the Committee on Buildings and Structures. In the absence of the chairman this was presented by Martin Schreiber. It consisted of recommendations for proper waiting rooms and shelters for electric railways and a form of contract and bond for railway structures. In the discussion which followed, the relative advantages of mill construction and reinforced concrete formed the principal topic.

### Power Generation.

The report of the Committee on Standards was then presented by H. H. Adams. The action of this committee on the various matters which had come before it was taken up in detail and votes were taken by the Association on such matters as had not yet come before it.

The report of the Committee on Power Generation was then presented by G. H. Kelsey. This report took up the subjects of methods for selecting faulty high-tension cables at the power house, chemical laboratory practice, peak loads and boiler settings and furnace design. Each of these subjects was treated by a sub-committee.

W. H. Sawyer reported on methods of selecting faulty cables. The various methods now in use were mentioned and a suggestion by H. G. Stott was recommended. The general conclusions were that present methods are inadequate, that ground detectors are not satisfactory, that the Torchio-Varley system meets at best only local conditions, that relays have never handled all conditions satisfactorily, and that the cost of the Merz-Price system is too high. Mr. Stott's method is to install in the main station, which must have a double busbar, a three-phase transformer with a one-to-one ratio, having high reactance and poor regulation. To select a faulty cable it is only necessary to connect one end of this transformer to the high-tension busbar in service, and the other end to the busbar not in service, and then connect the cables one at a time through this transformer. The condition of the cable will be indicated by ammeters connected in the circuit.

C. A. Hobein reported on chemical laboratory work and dealt with tests of coal, water and oil. Statistics were collected from a number of companies and the methods in use in typical laboratories were fully described. This report was received with much favor and was discussed at some length.

A report by L. P. Crecelius on boiler settings was then read by Secretary Litchfield. This treated of improvements in effective economy and of increased capacity. He advocated sufficient distance between grate and water tubes to provide ample room for combustion. In his tests of boilers at heavy overloads he found rapid deterioration of the fire-brick linings.

This was overcome by using special bricks made of bauxite.

The report of the Committee was approved and adopted and the session then adjourned.

### Joint Session on Accounting.

On Thursday morning a joint session of the Engineering and Accountants' Associations was held, President Ackerman occupying the chair. The first report, that of the Joint Committee on Engineering Accounting, was presented by the chairman, F. B. Lasher. This was discussed at some length, especially with reference to time keeping being handled by the Auditing Department. The report was approved.

L. T. Hixson, vice-president of the Accountants' Association, then took the chair and called for the report of the Committee on Life of Railway Physical Property, which was presented by Martin Schreiber. This report made no attempt to strike any general average concerning the life of railway material, but it was aimed to secure information and data on this subject which could be recorded as a guide for study rather than as a rule for action. A standard classification was formulated as a guide. The custom of compiling figures to represent life in a particular case when such figures are based upon investigation of other properties under different conditions is regarded as unscientific and often unfair. The Committee has assembled a bibliography of the subject, which constitutes an appendix to the report. It has also tabulated nearly all the published figures used in considering depreciation of railway property. This is given in another appendix.

This report was discussed at some length, the consensus of opinion being that no definite value for life could be fixed for all conditions. There was some difference of opinion as to whether obsolescence should be included in a consideration of life. The classification of the Committee also came in for consideration. The report of the Committee was accepted and it was continued for further investigation of the subject.

After the close of the joint session the Engineering Association held a separate session, which was opened with the presentation by Secretary Litchfield of his resignation, to take effect upon election of a successor. He pointed out that the work of the office was too great for an engineer actively engaged and suggested that the office be consolidated with that of secretary of the American Association. The resignation was accepted after several members had expressed their appreciation of the work of Mr. Litchfield. H. H. Adams then presented Mr. Litchfield with a gold watch and chain as a token of the appreciation of his services by his associates.

A motion was then passed to wire to President McCarter the regrets of the Association at his inability through illness to be present. Later in the session General Harries delivered a message from Mr. McCarter expressing the latter's regrets at his inability to be present.

The report of the Committee on Way Matters was presented by J. M. Larned. The principal subjects of the report were rail sections and joints therefor, a revision of specifications for rails and alloyed steel rails. It was pointed out that titanium-steel, manganese-steel and nickel-chrome-steel had given good results in practice. The latter made from Cuban ore can be obtained at the usual price. The Committee recommended four rail sections for adoption as standard, two designs for joint plates as recommended practice, and presented revised specifications for open-hearth girder and high T rails as recommended practice.

The discussion was concerned principally with the rail sections, the manufacturers as well as company representatives taking part. R. F. Kelker described the use of the continuous rail which had been tried in Chicago. With this rail the base and head section are separated and are placed so that the joints are staggered. A machine is then run over the track and crimps in the flanges of the head section, so as to form a compound girder.

A vote of thanks to the Committee was passed and its recommendations on rail sections turned over to the incoming committee for definite action next year. The report of the Committee in relation to the specifications for open-hearth girder and high T rails was accepted.

The final session of the Association was held on Friday with President Ackerman in the chair. The report of the Committee on Heavy Electric Traction was, in the absence of the chairman, presented by Hugh Hazelton. This report considered standard clearance lines for third-rail working conductors and clearances for automatic train stops, the former being recommended as standard. After a short discussion this was adopted.

The report of the Committee on Equipment was then presented by F. R. Phillips. The principal matters taken up by this committee were self-propelled cars and the squealing of steel wheels.

### Self-Propelled Cars.

The sub-committee on self-propelled cars, consisting of E. W. Holst, J. M. Bosenbury and W. Thorne, presented in an appendix a bibliography of literature pertaining to the subject and an extended discussion of modern equipment and results. The matter will be further considered next year. The use of steam, compressed air, storage battery and gasolene were considered for motive power and the development of the matter historically considered. A storage-battery locomotive was used as early as 1880 and a storage-battery car in 1885. The operation of the Third Avenue Railway Company in New York with lead batteries, and the Edison-Beach cars were considered in detail. The names of 12 interurban roads using the latter type of car were given. Details of operating expenses, efficiency, weights, etc., were given for both types of battery cars. Gasoline-electric cars were also considered in detail as regards both construction and operating costs, both in this country and abroad. Both of these were compared with the ordinary trolley car. The self-propelled car is best suited for infrequent service, light traffic and numerous stops. The storage-battery car is best suited for unimportant city lines where the trolley is forbidden; where it is feasible to charge a number of cars during low-load periods for rush-hour service; and for use on suburban extensions where the traffic is small.

In the discussion W. B. Potter stated that these two forms of motive power were the best adapted for self-propelled cars and each has its field. He spoke in detail of gas-electric cars, stating that the gasolene consumed per ton-mile is the same whether electric drive or mechanical drive be used. He gave some additional figures applying to the gas-electric cars on the Dan Patch line, the total cost per motor-car-mile being 17.8 cents and per car-mile about 13 cents. It is impossible as yet to determine the proper allowance for depreciation, but 2.5 cents per car-mile is an estimate. There are many lines which can be more economically equipped and operated by self-propelled cars than by complete electrification. With a headway of about two hours the results are about the same. If the headway is longer the results distinctly favor the self-propelled car.

N. W. Storer criticized the figures which were taken as a basis of comparison between trolley and storage-battery cars.

F. E. Drake spoke of the experience in Europe with the gas-electric car. The most notable case of this system is in Hungary, where one road has a record of over 5,000,000 motor-car-miles. The cost details of this system were given in the committee's report. The average cost of maintenance has been between 2.5 and 3 cents per car-mile.

S. T. Dodd did not consider there

was any field for the storage-battery as an auxiliary in the gas-electric car.

R. Beach stated that the efficiency of the Edison battery was better than the figures given in the Committee's report, and he quoted results which had been obtained in actual operation with a car which has traveled 75,000 miles. He spoke of the design of the Edison-Beach cars, which have been made as light as possible and provided with wheels which rotate independently of one another, thus reducing the friction losses. On a run from West Orange to Atlantic City one of these cars consumed 32 watt-hours per ton-mile. In other cases the value has varied from 27 to 87. The oldest battery of this type has been in operation for seven years and shows no depreciation. An Edison battery develops 19 watts per pound, which is about double that obtained from a lead battery.

T. Milton corrected some of the figures given by the Committee on lead storage batteries and stated that an Exide battery on the Third Avenue Railroad had run 26,000 miles without renewals. He also criticized some of the figures used as a basis for comparison with the Edison battery. Hugh Hazelton and E. W. Holst also joined in the discussion.

### Squealing of Steel Wheels.

The Committee has accumulated data and made tests on squealing which exists principally where steel wheels are used in city service. The Committee considers that it is little influenced by truck or track conditions and is produced on all types of wheels. Variations in brake-shoe composition affect the squealing, which is reduced where lubricating inserts are used. Water on the track or other lubrication lessens or obviates squealing. Insertion of lead in the brake shoes had proved the most efficient remedy and the coefficient of friction was not lessened appreciably.

H. H. Adams had obtained best results by placing the lubricating insert in the flange way. He had found that the vibration was set up between the flange of the wheel and the head of the rail.

F. W. Sargeant stated that the noise was due partly to the sliding of the brake shoe on the wheel and partly from the grinding of the wheel flange against the side of the rail. The noise varies with the position of the wheel with regard to the rail and is diminished when the rail is moist. He was now furnishing a special brake shoe with a filling in the flange way which eliminated the noise and at the same time reduced the flange wear. He agreed that the noise is found in all wheels but has a maximum with rolled steel. He considered track conditions largely responsible for the noise.

J. Q. Brown quoted experiences which substantiated Mr. Sargeant's views.

H. A. Mullet had found trouble after the adoption of steel wheels and had found relief by the use of graphite inserts in the brake shoe.

Other matters considered by the Committee were end wear on journals, heat-treated gears and pinions, couplers and end connections for interurban cars, and specifications for steel wheels, cold-rolled axles and carbon-steel axles. The recommendations of the Committee in these matters were adopted and a vote of thanks given the Committee for its excellent report.

A motion was then passed extending the thanks of the Association to President Ackerman for his able work.

### Election of Officers.

The Committee on Nominations then made its report and the secretary was instructed to cast a ballot for the candidates nominated, as follows:

Fresident: Martin Schreiber.
First vice-president: L. B. Crecelius.
Second vice-president: John Lindall.
Third vice-president: J. H. Hanna.
Secretary and treasurer: H. C. Donecker.

Executive Committee: B. F. Wood, F. R. Phillips, Norman Litchfield and J. Q. Brown.

The meeting then adjourned.

## Transportation and Traffic Association.

The fifth annual convention of the American Electric Railway Transportation and Traffic Association was assembled at 2:45 p. m., Monday, October 7, with President John N. Shannahan in the chair. The first item on the program was the reading of the annual presidential address. In this Mr. Shannahan first pointed out the growing tendency to have the convention program filled with committee reports instead of individual papers. These reports give a broad review of the progress of the industry and have brought about much desired standardization of methods, particularly through the adoption of standard codes of rules for city and interurban lines. The latter are being adopted by some of the state railroad commissions. Further efforts are again being made to bring the rules of the steam railroads and of the electric interurbans into closer agreement.

Reports were presented by the Executive Committee, Secretary-Treasurer H. C. Donecker and the Committee on Subjects. The new members admitted totaled 106 and the number of associate members in the Association at the time of the secretary's reports was 350. The Committee on Subjects was abolished as its work will hereafter be taken by the Executive Committee. A Resolutions Committee, consisting of E. C. Faber, L. C. Bradley and E. F. Peck, was appointed.

The report of the Committee on City Rules was presented by E. F. Peck. This report recommended some slight changes in the bell signals from motorman to conductor and the substitution of the city rule regarding railroad crossings for the present interurban rule. Respecting rules for prepayment-car operation considerable difference was found in the prevailing practice, due largely to difference in the types of car and equipment used.

This report received much discussion. The general sentiment of this was that the changes recommended be made and they were so ordered. The rules for prepayment cars received much attention and were referred back to the committee. There seemed to be some difference of opinion as to whether general rules could be adopted for pay-as-you-enter cars that would not require some amendments to adapt them to the different locations of the entrance and exit doors and to local regulations regarding riding on front platforms, separation of white and colored passengers, collection of extra fares at city limits, terminal points, etc. Many suggestions were made to the committee that would overcome some of these local conditions. Among those taking part in this general discussion were C. Loomis Allen, W. C. Callahan, J. C. Collins, E. C. Faber, C. D. Emmons, J. W. Brown, T. C. Cherry, S. Boyce, C. H. Matthews, W. B. Rockwell, M. C. Brush, D. A. Hegarty, H. C. Page, F. T. Wood, E. E. Franklin, F. J. Stevens and Messrs. Lyon, Wells and Shannahan.

The report of the Committee on Interurban Rules was then taken up on its presentation by Mr. Collins. The committee recommended the same changes as the Committee on City Rules and also slight changes as to flag and lamp signals, placing of torpedoes, issuing of orders and explanation of orders when changing off. An appendix gave comments by member companies as to their use of both the codes of city and interurban rules.

The discussion that followed the presentation of this report dealt chiefly with the question whether one or two torpedoes should be used and the regulations respecting dispatcher's orders to the train crew. The committee's

recommendations were adopted. Participating in the discussion of the proposed changes in interurban rules were T. C. Cherry, W. B. Rockwell, J. C. Collins, C. D. Emmons, O. S. Lamb, M. D. Kilbride, C. Loomis Allen, L. C. Bradley, Secretary Donnecker and President Shannahan.

A report of the Committee on Uniform Definitions was then presented by Mr. Brush. This was accepted and the committee continued for another year.

**Joint Session with Accountants.**

On Wednesday morning there was held a joint session of the Transportation and Traffic Association with the Accountants' Association, President Shannahan of the former, presiding at first. The report of the Committee on Passenger Traffic was presented by J. E. Gibson.

Among the topics briefly considered in this report are: chartered-car tariffs, co-operation with winter and summer resorts, interline business with steam railroads, distribution of the peak load by requesting manufacturers to extend their opening and closing hours, stops for limited cars, extra-fare cars, funeral cars, etc. The committee made no definite recommendations along these lines but merely reported the practice prevailing in different parts of the country. E. F. Schneider briefly discussed the report, pointing out that funeral cars can produce considerable more revenue than the regular chartered car.

F. D. Norviel presented the report of the Committee on Express and Freight Traffic.

This report was a candid discussion of the possibilities of this business and of the competition that it must be prepared to meet. Express and freight traffic is practically confined to interurban lines, but some suburban lines have developed a good business in express and package transportation. Wherever undertaken the results of this branch of the traffic have almost invariably justified the efforts and in many instances have been quite gratifying. Few companies undertake a pick-up and delivery service, although this may be worth considering. The committee calls attention forcibly to the development of the autotruck as a possible competitor to the electric express and short-haul service and advises companies contemplating express and freight service to undertake it without delay so as to forestall the establishment of auto delivery. Appended to the report are some 20 views of electric express and freight cars and trains, warehouses and terminals.

In the discussion of this report F. W. Coen spoke of an autotruck service around Cleveland, O., which was at such low rates that it must bankrupt its backers if continued. C. B. Hammond and Messrs. Franklin and Smith described briefly very successful electric express and freight service near Elmira, N. Y., Portland, Ore., and Frederick, Md.

President Young of the Accountants' Association then took the chair and introduced William M. Steuart, chief statistician of the Department of Commerce and Labor, Washington, D. C.

Mr. Steuart made a short address on the work that the Census Bureau undertakes each five years in compiling the statistics of various industries. This year data are to be gathered on the electrical industries and he urged the street-railway interests to co-operate with the Federal Government in making these data complete and accurate, so as to show exactly what has been the growth of the industry in the last five years.

A vote of thanks was extended to Mr. Steuart and a motion was carried for the appointment of a joint committee to co-operate with the Census Bureau in gathering the desired information.

J. C. Collins then presented the report of the Joint Committee on Express and Freight Accounting, which pointed out the difficulties of properly segregating the expenses of the passenger and freight departments, but the great desirability of doing so as far as possible in order to find whether each department is on a paying basis and what equitable rates should be. Those charges that are distinctively for the freight service should be assigned in that way and the number of charges that must be prorated should be reduced to the fewest possible. The committee recommended that a classification of revenues should be considered in next year's report.

The report was discussed by W. Shroyer, J. K. Choate, E. H. Hyman, J. C. Collins, L. T. Hixson, P. P. Crafts, F. D. Norviel and Mr. Smith. Several of the speakers said they had successfully applied the classification of expense accounts recommended in the committee's report of a year ago. Mr. Norviel advocated the use of the ton-mile as the best unit of comparison; Mr. Choate claimed it was not a practical unit. The report was accepted.

The Committee on Fares and Transfers and Prepayment-Car Operation presented a report read by T. C. Cherry, its chairman. This report considered first the collection and accounting of interurban fares; through fares instead of collection by zones was recommended, also the use of hat checks to show the destination and the kind and amount of fare collected. An appendix shows that the growing use of transfers is reducing the average rate of fare. Another appendix advocates the use of cash boxes in prepayment-car fare collection and accounting.

Among those discussing the recommendations of the report were E. F. Schneider, Calvert Townley, President Shannahan, T. C. Cherry, F. W. Coen, J. K. Choate, R. J. Clark, W. H. Boyce, M. W. Glover, W. B. Rockwell, W. H. Force, M. C. Brush, C. B. Hammond, M. R. Boylan, H. S. Swift, C. B. Wells, J. V. Sullivan and Messrs. Franklin and Pantell. Most of the committee's recommendations were adopted one by one except as to the collection of coupons and cash fares on reaching the city limits from interurban lines and as to the use of hat checks.

A report from the Committee on a Statistical Unit for Car Operation was presented by C. H. Lahr, chairman. This made no recommendations, but showed that the car-mile is mostly used. Other units suggested are car-hour, ton-mile and seat-mile.

The report was discussed by Mr. Harvey, who advocated further consideration of the matter in the hope of arriving at a much desired common unit. He suggested still another unit, viz., cost per ton-mile per car-hour. The report was accepted and the committee continued. The session then adjourned.

**Joint Session with Claim Agents.**

Thursday morning's meeting opened as a joint session with the Claim Agents' Association. Bruce Cameron presented the report of the Committee on Training of Transportation Employees.

This is an extended report reviewing the recommendations of earlier committees (which have been generally adopted), reporting on the actual practice prevailing, discussing the organization of the transportation department, the selection, instruction, supervision and dicipline of trainmen and recommending more care in each of these matters. Appended to the report are organization charts and data bearing on the subject.

President H. K. Bennett of the Claim Agents' Association then presented a report from a committee of that body on the same subject. This showed graphically that the great bulk of accidents are caused by men who have been but a short time in the service, 61 per cent being caused by first-year men.

Both reports were discussed together, each recommendation being taken up in turn. Particular interest was shown in the matter of disciplining the men and it was the general sentiment that suspensions were undesirable and that dismissals should not be made except as a last resort. Other topics also aroused a lively interest, it being evident that the transportation officials realize that proper training and humane treatment of the men go a long way in making an efficient and contented corps of men. Among those discussing various parts of the reports were M. C. Brush, B. Cameron, Secretary Donnecker, L. C. Bradley, J. J. Burleigh, W. C. Callahan, E. F. Snyder, E. C. Ecker, George Carson, J. C. Collins, E. P. Walsh, W. Tichenor, J. K. Choate, J. J. Reynolds, D. A. Hegarty and C. B. Wells. Practically all the recommendations of the committees were adopted.

F. H. Hughes then made a brief address on what is being done to educate the public on the prevention of accidents, illustrated by many lantern slides. The claim agents then retired to a separate meeting room.

The Committee on Construction of Schedules and Time-Tables submitted a report read by its chairman, W. R. W. Griffin. This report dealt chiefly with operating rules and conditions that affect the preparation of schedules for the train crews. Many of the recommendations were along the lines referred to in the report on training of employees. Particular attention was given to rules and discipline for misses and failures to report for duty. The committee's report was adopted in sections and as a whole.

A paper on "One-Man Prepayment-Car Operation" by S. R. Inch was presented by title at the suggestion of the author, on account of the lateness of the hour. This paper described the successful operation of prepayment cars in Missoula, Mont., where the motorman alone operates the car and collects the fare. This paper was briefly discussed by C. D. Emmons and Mr. Inch, the latter explaining that legis-

lative efforts had been made to compel placing two men on each car, but that the local representatives defeated this. The motormen receive higher pay than prevails in other communities and are pleased with their work.

The Committee on Resolutions then presented its report recommending the passage of resolutions of thanks to the executive officers of the association and others who had contributed to the success of the convention. This was unanimously adopted.

A report of the Committee on Nominations was then presented by its chairman, J. K. Choate. The nominees were as follows: Dana Stevens, of Columbus, O., president; D. A. Hegarty, B. C. Brush, H. A. Nicholl, respectively, first, second and third vice-president; H. C. Donecker, secretary; C. B. Buchanan, W. R. W. Griffin, L. C. Bradley and J. McMillan, members of the executive committee. By unanimous vote the secretary was instructed to cast a joint ballot for these men as officers of the T ansportation and Traffic Association for the ensuing year. The convention then adjourned.

### Claim Agents' Association.

At the close of the Wednesday session of the Claim Agents' Association, President Bennett, on behalf of the executive committee, presented each of the past presidents of the Association with a solid gold badge. The badge was inscribed with the recipient's name, the name of his company, and his official title.

Those receiving badges were H. B. Dibbs, H. R. Goshorn, C. B. Hardin, E. C. Carpenter and H. B. Brown.

The Association voted to change its name to that of the American Electric Railway Claims Association, and the organization will hereafter be known by this title.

The following officers were elected for the ensuing year:

President, C. A. Avant, Birmingham Railway, Light & Power Company.

First vice-president, W. F. Weh, Cleveland Railway Company.

Second vice-president, W. Tichenor, Terre Haute, Indianapolis, & Eastern Traction Company.

Third vice-president, George Carson, Puget Sound Traction, Light & Power Company.

Secretary-treasurer, B. B. Davis, of the Columbus Railway & Light Company.

### Accountants' Association.

After a well attended and very busy series of meetings, the Accountants' Association elected the following officers for the ensuing year:

President, J. H. Neal, Boston Elevated Railway.

First vice-president, M. W. Glover, Mobile Light & Railroad Company.

Second vice-president, G. W. Calweit, Milwaukee Electric Railway & Light Company.

Third vice president, F. B. Lasher, New York State Railways.

Secretary-Treasurer, M. R. Boylan, Public Service Railway, Newark, N. J.

Executive Committee: F. E. Wilkin, Des Moines City Railway; George G. Whitney, Washington Railway & Electric Light Company; Thomas P. Kilfoyle, Cleveland Railway; Robert J. Clark, Kansas City Railway & Light Company.

## Convention Notes.

### Entertainment.

The reception to the American Electric Railway Association and the affiliated associations, was held at the Congress Hotel on Monday evening. The receiving line included General Harries, C. Loomis Allen, F. S. Young, H. K. Bennett, C. L. Henry, R. Morrison, Jr., Martin Schreiber, E. O. Ackerman, J. Hanna, John Lindell, J. M. Shannahan, D. A. Hegarty, C. S. Hawley, C. C. Peirce and Henry Evans.

The entertainment included a recital and vaudeville for the ladies at the Blackstone Hotel on Tuesday afternoon, a card party for the ladies and gentlemen at the Congress Hotel on Tuesday evening, an automobile trip over the park system, with afternoon tea at the South Shore Country Club for the ladies on Wednesday, and the annual grand ball at the Congress Hotel on Thursday evening.

Through the courtesy of the South Side Elevated Railroad Company the delegates were presented with complimentary passes, good for rides all over the city all during convention week. The company also invited the visitors to inspect the power stations and various plants of the system.

The Commonwealth Edison Company invited the delegates to visit its power plants and substations. Many of the visitors to the city took advantages of this to inspect the new Northwest station and the other big stations of the company's system.

The Aurora, Elgin & Chicago Railway Company gave a complimentary trip to the delegates over its line from the terminal in Chicago to Aurora and return. A stop-over was made at Batavia for the inspection of the power house.

On Wednesday evening from 8:00 to 10:30 o'clock the exhibits were thrown open to the general public. The executive committee decided upon this feature owing to the great interest that was manifested all over the city in the magnificent display of the manufacturers.

A dinner to fifteen of the delegates from the properties operated by Allen & Feck was given at the Union League Club Wednesday evening.

### Mr. Sawyer's Dinner.

On Thursday evening L. P. Sawyer, Manager of the Buckeye Electric Works of the General Electric Company, Cleveland, O., gave an elaborate dinner at the College Inn. The repast was delightful, and was greatly enjoyed by Mr. Sawyer's guests, who were Frank Hadley of New York, Samuel G. McMeen of Columbus, O., W. O. Wood, New York, D. A. Hegarty, New Orleans, T. F. Mullaney, New York, C. J. Griffith, Little Rock, Thomas Finnegan, San Francisco, H. M. Wilson, New York, and A. A. Gray of Chicago.

### Annual Meeting of the Manufacturers' Association.

The annual meeting of the American Electric Railway Manufacturers' Association was held on Wednesday afternoon. President Conwell was in the chair and announced that Chicago had supplied 100,000 square feet of floor space, enabling the association to make a very complete and extensive exhibit. The membership had grown from 330 to 349 during the year. The exhibits had taken 74,000 square feet of space, exclusive of the track exhibit.

C. C. Peirce of the General Electric Company, described the 11,000-mile trip which had been taken by the officers of the American Electric Railway Association and the Manufacturers' Association. Vice-President Harries and Ex-President A. W. Brady, of the American Electric Railway Association, congratulated the Manufacturers' Association upon the splendid exhibits, and commented upon the community of interest which was so pleasing a feature of the work of the manufacturers and the operating railway men.

E. H. Baker, vice-president, in charge of exhibits, explained the work of the exhibition committee, and paid a fine tribute to Secretary McConnaughy for the magnificent work he had done in bringing about so satisfactory an exhibit.

The following were elected members of the executive committee:

C. J. Mayer, of the Electric Service Supplies Company, to succeed M. C. Miller, formerly of the Allis-Chalmers Company, for the unexpired term ending in 1914.

S. K. Colby, vice-president Pierson, Roeding & Company, San Francisco, for a three-year term.

W. L. Conwell, president Transportation Utilities Company, for a three-year term.

C. C. Peirce, of the General Electric Company, for a three-year term.

D. W. Smith, of the Peter Smith Heater Company, for a three-year term.

H. C. Evans, of the Lorain Steel Company, for a three-year term.

### The Exhibit.

The exhibit of the Manufacturers' Association was particularly elaborate, occupying the main hall of the amphitheater and five of the wings adjoining on either side. In addition to the exhibit on the ground floor of the main hall there was an extensive exhibit in the galleries flanking each side of the arena.

The decorations were lavish and to a degree spectacular. The beautiful feature of the exhibit was the Corinthian columns made of "Moonstone" glass, supplied by the Jefferson Glass Company, Follansbee, W. Va. These columns, which were surmounted by an 18-inch ball, were illuminated by incandescent lamps. During the day they presented a striking effect and in the late afternoon and evening they attracted the greatest interest, and elicited the most favorable comment. This is the first time that the illumination

of a column of glass of these dimensions has ever been carried out on so extensive a scale, and Secretary McConnaughy deserves great credit for introducing so successfully this beautiful display of decoration and illumination.

Among the manufacturers the following exhibits and exhibitors were noted:

**Allis-Chalmers Company,** Milwaukee, Wis., was the center of a great deal of interest at all times. The working exhibit of full-size material, in some instances bringing to the attention of the operating man a revolutionary idea in electric railway practice, attracted constant attention. A feature of this exhibit was the new Type A C-3 air compressor. This compressor has a displacement of 18 cubic feet of free air per minute. Gears are entirely eliminated, the armature of the motor being mounted directly upon the crank shaft. There are only two bearings, of liberal area, the moving parts, including the main bearings being lubricated by the splash of the connecting rods; the oil is contained in the crank-shaft chamber. The company also exhibited air-brake equipments and accessories, portable motor-driven compressor, transformers, motors, generator, motor-generator, and converter equipment, steam and hydraulic turbines. Represented by C. A. Tupper, H. W. Cheney, W. R. Crawford, A. W. Burns, E. Dryer, F. Von Schlegel, C. M. McDonald, J. W. Gardner, J. T. Cunningham, J. L. Dimm.

**American Steel & Wire Company,** Chicago, Ill., showed a full line of rail bonds, bare and insulated wire and cable, rail-bonding tools, right-of way fences and steel fence posts. Represented by C. S. Knight, Jr., B. H. Ryder, George A. Cragin, C. P. Vaill, F. A. Keyes, H. H. Febrey, C. J. Boon.

**Albert & J. M. Anderson Manufacturing Company,** Boston, Mass., exhibited knife switches, time switches, Aetna over-head line material and charging plugs and receptacles for charging storage batteries. J. M. Anderson, W. W. Hincher, G. B. Crane and Ernst Woltmann were in attendance.

**Archbold-Brady Company,** Syracuse N. Y., displayed attractive models of transmission-line materials, photographs of the company's factories and a collection of instructive catalogs and bulletins. W. K. Archbold, the president of the company, was its representative.

**The Bridgeport Brass Company,** Bridgeport, Conn., manufacturers of "Phono-Electric" trolley wire, was represented at the convention by Wylie Brown.

**Central Electric Company,** Chicago, Ill., exhibited Okonite wires and cables and other products, high-voltage insulators, dry batteries, lamps, shop-receptacles, plugs, etc. Represented by T. C. Ringgold, J. M. Lorenz, R. M. Baker, R. S. Kacin, J. S. Harley.

**Corliss Carbon Company** exhibited carbon brushes and a machine for testing the hardness of same, and had a special demonstration of a commutator driven by a motor. Otto Koch, president of the company, Fred Mulhaupt and F. L. Smith, president of the Kendall Refining Company, were in attendance.

**The Crouse-Hinds Company,** Syracuse, N. Y., made an elaborate exhibit of arc head lights of both the carbon and luminous types, incandescent headlights, flush and surface types, car-wiring condulets and condulets of all kinds for open-conduit wiring. It had also an exhibit of panelboards and cabinets, guy anchors, round-house reflectors and knife switches. Represented by F. F. Skeel, G. Dubsky, Frank Buchanan and D. C. Gidley.

**D. & W. Fuse Company,** Providence, R. I., exhibited Detabeston armature and field coils, wire, magnetic chucks, fuse boxes and electric railway specialties. Represented by H. F. MacGuyer.

**Dearborn Drug & Chemical Company,** Chicago, Ill., maintained a busy reception headquarters where the friends of the company were entertained by F. S. Hickey, A. S. Cooke, George R. Carr and Paul T. Payne.

**Joseph Dixon Crucible Company,** Jersey City, N. J., exhibited brushes, crucibles, etc. F. R. Brandon was in charge, assisted by Messrs. Condit and Snyder.

**Duplex Metals Company,** Chester, Pa., exhibited copper-clad steel wire, both bare and weather-proof, for telephone and other purposes. A sample of copper-clad trolley wire was exhibited, which had been used at a corner in Indianapolis, where it was passed over by more than 1,600,000 cars, and was still in good condition. A. D. Rummel was in charge of the exhibit and C. B. Semple, Ted Fondersmith and C. H. Cameron were also present.

**Electric Railway Equipment Company,** Cincinnati, Ohio, exhibited a fine line of combination trolley pole and lighting standards, overhead line material, brackets, mast arms and pole fittings. Represented by W. A. McCallum, A. L. Johnston.

**Esterline Company,** Lafayette, Ind., exhibited graphic meter, graphic speed recorder, Golden-Glow headlight. Represented by J. W. Esterline, George Bell, O. P. Smith.

**General Electric Company,** Schenectady, N. Y., featured a number of comparatively new machines. The new Sprague General Electric type M K control for city cars, was shown in full operation, mounted as in service operation. The new G. E.-200, G. E.-203 and G. E.-201, commutating-pole motors were shown. The exhibit also included straight air-brake equipment, mounted for a working demonstration, the air compressor shown in detail, a glass cover permitting a clear view of the interior; overhead line material; 600-volt direct-current aluminum-cell lightning-arrester; luminous arc headlights, equipped with the new semaphore lens, giving great concentration of light; steam flow meters; battery-truck crane, ozonators, etc. Represented by W. B. Potter, C. C. Pierce, F. H. Gale, J. G. Barry, A. K. Baylor, F. E. Case, E. H. Ginn, J. F. Layng, H. N. Latey, L. W. Shugg, C. E. Evelith, J. H. Livsey, H. C. Marsh, W. G. Carey, E. P. Waller, V. E. Raggio, W. A. Woolford, W. J. Clark, George D. Rosenthal, J. C. Calisch, C. E. Sprague, S. W. Trawick, M. M. Corbin, H. L. Monroe.

**General Vehicle Company,** Long Island City, N. Y., exhibited a two-ton tower wagon built for the Milwaukee Electric Railway & Light Company, and a 2,000-pound industrial truck. Represented by E. E. Witherby, W. J. MacDonald, T. W. Barnes.

**W. J. Jeandron,** New York, exhibited the imported "Le Carbone" brushes and samples of carbon for switch breaks, microphones, etc. W. J. Jeandron personally attended the exhibit, with Halsey Steins.

**H. W. Johns-Manville Company,** New York, showed a complete line of J-M fiber conduit with fittings; the latest developments in "Noark" protective devices; J-M ebony asbestos wood for switchboards; overhead line material, including trolley retrievers, lightning arresters, etc.; molded insulation, such as molded mica, "electrobestos" and "Vulcabeston." The Audiffren-Singrun refrigerating machine attracted much attention. This is a small, efficient and simple refrigerating and ice-making machine for use in residences, hospitals, clubs, etc., operated by one-half to four-horsepower motor. Represented by H. M. Frantz, manager of the Electrical department, Chicago branch; H. W. Frantz, of the Chicago branch; J. C. Younglove, assistant manager, railroad department, Chicago branch; and George A. Saylor, manager electrical department, Milwaukee branch.

**Massachusetts Chemical Company,** Walpole, Mass., maintained a reception headquarters, exhibiting insulating material and other specialties. Represented by L. O. Duclos, A. E. Duclos, E. W. Furbush.

**Mica Insulator Company,** New York, exhibited samples of mica and micanite made up in form for various uses in construction and repair of electrical apparatus. Charles H. Bell, Charles E. Coleman and A. F. Tinnerholm were in attendance.

**Minerallac Electric Company,** Chicago, Ill., showed a very interesting line of insulating material, the printometer and "Maxicator." The new Blair third-rail insulator, made of creosoted wood, attracted a great deal of favorable comment. Represented by H. S. Sines.

**National Carbon Company,** Cleveland, Ohio, a full line of carbon brushes, including Laclede, Columbia, Partridge, Graphoid. Represented by O. T. Weaver, F. D. Kathe, E. H. Martindale.

**Ohio Brass Company,** Mansfield, Ohio, exhibited overhead trolley supplies, catenary supplies, rail bonds, including new type of bond for ball of rail; third-rail insulators; national railroad trolley guard; "O-B Hi-Tension" porcelain insulators; Tomlinson automatic car couplers, with air and electrical connecting features; Tomlinson M. C. B. couplers; trolley retrievers and catchers; trolley harps and wheels; trolley bases; air sanders. Represented by A. L. Wilkinson, E. F. Wickwire, A. B. Edes, A. L. Price, C. T. Anderson, C. E. Young, J. R. Brown, N. M. Garland, J. E. Slimp, F. A. Strail, Nathan Shute, F. E. Johnson, C. A. Veatch, F. V. Cook, R. J. Deneen, C. P. Leibold, E. C. Brown, G. A. Kroener, W. H. Bloss.

**Pyrene Manufacturing Company,** New York, had a combination exhibit and demonstration. The demonstration was intended to indicate some of the properties of Pyrene and to show its effectiveness as an extinguisher of electrical fires. It was shown that a 500-volt electric arc between an inch carbon and a copper plate can be extinguished in less than a second with Pyrene. There were also incandescent

lamps with exposed terminals burning in a jar of this liquid, and a rheostat of Pyrene kept in circuit so as to demonstrate the insulating qualities of the material. E. M. Davidson, vice-president of the company, and R. C. Iddings were in charge.

**Rail Joint Company,** New York, had on exhibition an interesting collection of high "T" joints, girder joints and insulated joints. This company was represented by L. F. Braine, its vice-president, and V. C. Armstrong, E. A. Condit, Jr., W. A. Chapman, F. C. Webb, H. C. Holloway and W. S. Boyce.

**John A. Roebling's Sons Company,** Trenton, N. J., had an attractive display of both bare and insulated wires and lead-covered cables. There were also samples of wire ropes and fittings, motor leads, etc. G. W. Swan, of Buffalo; A. B. Conover, manager of the Chicago office; William Slingluff, and Fred M. Warner looked after the company's exhibits.

**Speer Carbon Company,** St. Marys, Pa., was represented by its president, J. S. Speer, and by Charles J. Lion, chief engineer for the company. The exhibit consisted of a complete line of carbon brushes for nearly every type of rotary electric appliances. There was also a new metallic brush for low-voltage machinery. The company's space was rendered quite attractive by an appropriate arrangement of photographs, etc.

**The Standard Paint Company,** New York, had a very complete exhibit of the specialties for the manufacture of which this company is so well known. Among these there were samples of P. & B. insulating compounds, varnishes and tape; dustless cement floor fillers, Impervide waterproofing and a general line of structural paint. H. A. Inwood, the firm's street railway representative, and Charles E. Smith, who has charge of its electrical department, were on hand to greet the company's friends and others interested in the exhibit.

**Standard Underground Cable Company,** Pittsburgh, Pa., exhibited lead-covered and armored power cable, bare and insulated wire, Colonial copper-clad wire, trolley wire, Davis open-air and station terminals, manhole junction boxes, cable jointing materials. Represented by J. R. Wiley, C. J. Marsh, A. A. Anderson, J. H. Lytle, E. J. Pietszker, E. K. Price.

**Sterling Varnish Company,** Pittsburgh, was represented by W. D. Whitfield and A. S. King. This space was attractively arranged with a complete line of catalogs and other matter descriptive of the company's products.

**The Waclark Wire Company,** New York, exhibited samples of bare and weatherproof copper wire and cable. A feature of this exhibit was a 225-pound wire bar and a fine wire 0.001 inch in diameter. Represented by W. A. Brown, E. L. Goldschmidt, Charles F. Lyman, and F. W. Wallace.

**Western Electric Company,** New York, exhibited overhead line material, car-equipment supplies, safety strain insulators, railway telephones and dispatching systems; Gold car heaters, Shelby trolley poles, Electrene fire extinguishers, Thomas high-tension insulators, Sterling-Meaker registers, Sturtevant vacuum cleaners, M. B. trolley harps and sand boxes, Matthews high-tension switches and boltless guy clamps, etc. There was also an exhibit of Mathias Klein & Son's electricians' and linemen's tools. M. A. Oberlander, R. H. Harper, F. D. Killion, K. L. Grant, J. H. Davies, D. C. Guest and T. F. Brennon were present to take care of the exhibit.

**Westinghouse Electric & Manufacturing Company,** East Pittsburgh, Pa., made a very elaborate exhibit, both in the main hall and out-doors. Among the features were the following: One of the 15 Baldwin-Westinghouse locomotives now being furnished the Southern Pacific Railroad, equipped with four 308-D-3 commutating-pole 600-1,200-volt railway motors; one of the 39 Baldwin - Westinghouse locomotives now being furnished the New York, New Haven & Hartford Railroad, equiped with eight 409-C 170-horsepower, 25-cycle, single-phase motors; 1,200-volt H L control equipment; a complete 600-volt type H L field control; 3070-4 commutating-pole, field control, box-frame motor; 306-OH commutating-pole, box-frame motor; 333-C commutating-pole, 600-1,200-volt, field-control motor; railway motor parts, exposed for positive inspection; brushholders; H L control parts; railway circuit-breakers. There was also a typical installation illustrating the application of the Westinghouse outdoor transformer, and a 25-kilowatt, 125-volt direct-current turbo-generator. Represented by Calvert Townley, C. S. Cook, M. B. Lambert, J. C. McQuiston, H. W. Cope, W. W. Briggs, S. J. Keese, F. H. Shepard, J. J. Sinclair, J. A. Brett, G. S. Vail, W. H. Swift, H. A. Cole, George Ewing, J. J. Gibson, Thomas Cooper, E. P. Dillon, J. G. Miles, H. A. Faber, C. G. Schluederberg, S. D. Levings, T. C. Eayrs, J. P. Alexander, H. C. Stier, R. H. Smith, D. L. Keiser, B. G. Lamme, N. W. Storer, G. M. Eaton, R. E. Hellmund, C. Renshaw, L. E. Schumacher, W. Schaake, G. H. Holy, L. J. Kirby, R. L. Wilson, F. W. Harrison, J. R. Ellicott, C. R. Ellicott, W. G. Kaylor.

## The Convention of the Sons of Jove.

The tenth annual convention of the Rejuvenated Sons of Jove was held at Pittsburgh, Pa., October 14, 15 and 16. Headquarters were established at the Fort Pitt Hotel. The city of Pittsburgh and all of the electrical interests made a most generous provision for the entertainment of the visiting Jovians, and on all sides the comment was heard that Pittsburgh had outstripped any other place where the convention has heretofore been held.

Registration began at 10:00 o'clock Monday morning, and the formal opening of the convention was at 2:00 o'clock Monday afternoon. W. H. Stevenson, president of the Chamber of Commerce of Pittsburgh, welcomed the Jovians to the city, calling attention to the great industrial activity centered in that city, and the widespread utilization of the products manufactured there. Jupiter, Robert L. Jaynes, who presided, called upon A. A. Gray, of Chicago, to make the response on behalf of the Sons of Jove.

The report of Mercury showed the order in a flourishing condition, there being a substantial balance in the treasury, and an increase of approximately 4,000 new members during the year.

In the evening a smoker and vaudeville was held at the Fort Pitt Hotel, over 900 enthusiastic Jovians listening to a fine program of entertainment.

On Tuesday morning there was a business and commercial session, and during the afternoon trips were made to the works of the Westinghouse Electric & Manufacturing Company and to the Carnegie Steel mills. In the evening there was a monster Jovian parade, followed by a rejuvenation at the Kenyon Theater.

On Wednesday morning the business session was held, at which time the following officers were elected:

Jupiter, Frank E. Watts.
Mars, W. D. Shaler.
Neptune, L. M. Cory.
Pluto, A. W. Woodville.
Hercules, H. A. Hart.
Apollo, L. S. Montgomery.
Avrenim, W. H. Vilett.
Mercury, Ell C. Bennett.
Vulcan, Charles L. Martin.

In the afternoon the degrees of Jovian merit were awarded and the convention closed with a banquet at the Fort Pitt Hotel on Wednesday evening.

Too much cannot be said for the energy and enterprise of the committees in charge of the convention. W. D. Shaler, chairman of the executive committee, came in for an ovation, and Henry Harris and H. B. Kirkland were indefatigable in their efforts to make things run smoothly. Carl Pierce was also an important factor in looking after the visiting Jovians, and he was ably assisted by Oscar Lepper, V. F. Gates, G. F. Slocum, C. E. Marsh, Frank Knapp, and a host of other Pittsburgh Jovians. Particular mention should be made of the efforts of Samuel Adams Chase, to whose good work before the convention much of the great success which was achieved may be attributed. Mr. Chase was ably assisted by Mrs. Chase, who looked after the visiting ladies as chairman of the ladies' reception committee.

Reception parlors were opened by the General Electric Company, Westinghouse Electric & Manufacturing Company, Hubbard and Company and the Sunbeam Incandescent Lamp Company.

London has 172,000 telephones, or one for every 26 inhabitants. Berlin comes second with 122,500 or one for 16 inhabitants. In Copenhagen there are 45,000 or one instrument for every 11 inhabitants.

## ELECTRIC VEHICLE ASSOCIATION OF AMERICA.

### Annual Convention, Boston, Mass., October 8 and 9.

The third annual convention of the Electric Vehicle Association of America was held at Boston in Faul Revere Hall of the Mechanics Building on October 8 and 9, 1912, during the most extensive electric show any American city has yet held. President Blood called the meeting to order shortly after 10:30 a. m., and made an address in which he presented the condition of the society today. The success which has attended its growth proves it to have been a wise move as the past year has seen an increase of 70 per cent in membership. The present membership is 335 which represents companies having capital accounts totaling five hundred millions of dollars.

Increasing numbers of electric vehicles are sold with a corresponding reduction in overhead charges and the large central stations are very generally using electric trucks giving strength to their arguments for their use.

Mr. Blood cited the fact that the gas-car interests have already recognized the standard position of electric cars by advertising for their self-starters that they are "simple as the electric." The price of gasoline is constantly advancing and is controlled by a united manufacturing interest, while the cost of electricity is uncontrolled and is decreasing.

The advertising campaign conducted under the auspices of the Association has brought many inquiries and shown results. Nearly the whole amount desired has been contributed.

The work of the various committees was referred to briefly and commended. Following President Blood's address the reports of the various committees were read. F. W. Smith, chairman of the Committee on Papers gave a brief resumé of the year's work and suggested that the custom of presenting a single paper at the monthly meetings be adhered to; that the papers be printed and distributed to the members sufficiently in advance to awaken interest and ensure discussion. He also suggested that close co-operation of the other standing committees would more easily enable the chairman to secure material and subjects for presentation. He mentioned particularly the work being done by the Massachusetts Institute of Technology on behalf of the Edison Electric Illuminating Company of Boston.

The Membership Committee reported a healthy growth showing a wide distribution of its membership, 17 members, nine of which are central stations hailing from west of the Mississippi. The Association now has two active branches, the New England Section and the Chicago Section.

Mr. Robinson, on behalf of the Emblem Committee reported the adoption of an official Association emblem now used on letter heads and on the buttons distributed to every attending member at the convention. It represents a wheel with gold hub, spokes and rim surrounded by the name "Electric Vehicle A. of A." The body of the button is blue.

The Report of the Committee on Insurance was read by the chairman, Day Baker. This Committee has been engaged in the collection of statistics on accidents and fires to such good purpose that liability insurance has been reduced 10 per cent, and fire insurance 25 cents per hundred. On the class of cars upon which the rate increased in July 1911 was "construction and repair cars of electric light and power companies, telephone and telegraph and street railway companies." This classification, however, does not refer to the ordinary commercial trucks used in the business of these companies, but rather to the "hurry-up" and line repairing wagons. If these companies would be a little more precise in describing their equipment, Mr. Baker states, a saving on a number of their trucks could be made because of different classification. He made a plea for further assistance in the collection of statistics and records in the expectation of a further reduction in insurance rates. C. Blizard next read the report of the Committee on Establishment of Courses of Instruction in Electric Vehicle Practice.

The lack of sufficient training has been evident to all electric-vehicle manufacturers and electric-garage proprietors and the situation has been detrimental to the growth of the electric vehicle industry. They were enabled to report that the West Technical High School of Cleveland, Ohio, and the Y. M. C. A. of Boston had prepared to establish courses in electric-vehicle practice.

The next report, that of the Committee on Standardization was presented by Mr. Churchward. He named a list of nine manufacturers who had agreed to adopt the charging plug in shape and dimensions as had been suggested and asked that the Association also give its endorsement since eight out of nine of the committee had voted in favor of so doing. It was also proposed that this body follow the lead of the Society of Automobile Engineers and adopt as standard the Ediswan bayonet socket for electric lighting of electric vehicles. Both of these recommedations were carried out by the adoption of resolutions after free discussion. Tires vary considerably in energy consumption so that the distance traveled on a given battery charge may vary as high as 25 or 30 per cent. It was suggested that a maximum tractive effort or draw-bar pull be standardized for a given size of tire so that all vehicles would be on an equal basis with the given tire.

E. S. Mansfield presented the report of the Committee on Rates and Charging Stations. It discussed the relative advantages from the standpoint of the sellers of energy of the private garages widely distributed, and the public garages concentrating the demand, buying current at a lower rate but at a greater load-factor. The Committee made a plea for a general practice in garages of making up the monthly total charge for keeping machines from several items, at least separating the charge for electricity from that of other service rendered. This has not been a general practice and since different persons use their cars so differently some were being under and some over charged under the flat-rate method. A number of drawings of signs for electric charging stations were submitted for approval and adoption of one of them requested.

After considerable discussion and criticism the matter was referred with suggestions to the Executive Committee, with power to act. It is expected that within a short period an official sign will be adopted and made available for garages all over the country.

"Where We Stand Today," was the title of the paper written by C. E. Michel, of St. Louis. It opens with the statement that the days of the horse are not numbered but past. Although this may be putting it rather strongly, Mr. Michel proceeds to show how great have been the improvements and how rapid the progress since a few years ago. There have been no meteoric careers and the sensationalist in speed matters has been conspicuous by his absence. The growth has been substantial, sure-footed and of healthy proportions. The central station has come to the realization of the value of the load; the public to the necessity for the car; and the manufacturer has developed and improved his product to fit a condition.

The crop of self-starters and coupé bodies brought out by the gas-car manufacturers in an effort to hold the business bears eloquent evidence that they realize they are being crowded off the city streets to the outskirts where they belong. Continuing, the author says it is generally accepted that as a result of inherited habit, we are accept-

ing limitations and objectionable features in horse transportation that would be absolutely fatal to the introduction of any unfamiliar transportation. Suppose the electric was the accepted method today with a familiarity of one hundred years' use, how impossible it would be to hope for the introduction of the horse. When reduced to cold facts, the actual competition we have to overcome is this mental condition and not engineering or cost problems. The central station gives conclusive evidence through the work done and money invested that it is convinced of the merits of electric vehicles and can be counted on as an active working ally. On the manufacturer rests the real burden of educating the business world as to what the electric can do, and when a central station puts in operation a fleet of electrics the manufacturer is certainly morally obligated to actively prosecute the development of the business in that territory. St. Louis increased the revenue from charging electrics $1,000 per month during the first six months of 1912. Another western city reports $67,000 per year revenue. New York City shows an increase of 35 per cent in the number of electric vehicles during the year ending June, 1912. George H. Jones of Chicago stated there had been an increase in that city of 400 per cent in the past year.

"Street and Traffic Conditions as related to the Electric Vehicle" was next told of by R. McAllister Lloyd. He treated his subject under two headings. (1) Streets—In the early days of the automobile industry it was frequently stated that economical transportation with self-propelled vehicles could not be accomplished until good smooth roadways were provided. There has been, however, enough pioneering spirit to push ahead and not wait for the streets. Bad streets have resulted in better vehicles. More rugged construction than would otherwise, perhaps, have been provided. The cost of upkeep would, however, be largely reduced if Belgian blocks could be eliminated, holes in asphalt filled up, proper rails used for trolley tracks and rails maintained flush with the street surface. It might seem appropriate for the Association to take the initiative in the promotion of a movement toward co-operation with kindred association in an endeavor to foster public spirit and engineering effort toward a higher standard in construction and maintenance of city street paving. (2) Traffic Conditions—Attention was directed to original conditions of old when streets were not intended for vehicle traffic. Coming down through the ages pedestrians were gradually crowded to the walls and sidewalks provided. But the pedestrians and playing children have inherited rights in the streets. All progress is not necessarily in the direction of greater speed, and civilization should be just as much concerned with their safety and comfort as it is with the cost per ton-mile of transporting merchandise or the cost per mile of operating a taxicab. People can not be banished from the streets and we must study methods for protecting them from injury. Up to the present time the electric vehicle has maintained a reputation for sane speed and ease of manipulation. From an engineering standpoint it is practicable to increase the speed 50 per cent but the advisability of so doing is questioned; in fact the best interests of humanity are conserved by continuing the speeds now prevailing.

In discussing this paper W. P. Kennedy advocated co-operation toward the improvement of city streets and suggested a license fee for horses, the proceeds to be devoted to paving and maintenance.

Day Baker told of the efforts of the Massachusetts Highway Commission to regulate the width of tires and to limit the weights carried. Insufficient engineering makes legislation inadvisable at this time. E. W. Curtis, Jr., told of similar efforts in New York. Similar discussion was entered into by Dr. Pender and Messrs. Scott and Cavanaugh.

In the absence of M. Ekstromer, his paper on "The Electric Vehicle in Denver" was read by H. F. Thompson. Nature endowed Denver with conditions which make her a veritable playground for the electric vehicle. The topography presents a relatively level country. Pavements are mostly asphalt and macadam. Climatic conditions are also favorable. Rates for charging are as follows: For the private garage, two rates; depending on whether charging be done on off-peak or peak schedule. If an off-peak, the minimum monthly charge is $5.00, plus four cents per kilowatt-hour over and above the minimum and subject to a discount of ten per cent. If charging be done through the peak, the only difference is in the minimum charge, which becomes $7.50 per month instead of $5.00. The company's rates for current to public garages are very low and the basis on which current is sold is as follows: Four cents per kilowatt-hour less ten per cent up to 1,250 kilowatt-hours per month, or three and six-tenths cents per kilowatt-hour. If in excess of 1,250, a discount of 25 per cent is allowed, or equivalent to three cents per kilowatt-hour; or a fixed or readiness-to-serve charge of $24 per year per horsepower connected, plus $9.00 per annum charge, plus a meter rate of three cents per kilowatt-hour for all current used, subject to a discount of 50 per cent on all secondary, or fifty and ten on all primary installations. Education and instruction are given to operators in both public and private garages and inspections are made whenever requested. Active solicitation is in progress with a view of interesting the heads and officials of firms in electric transportation of their wares. Data and comparative figures are furnished. A monthly magazine, *The Electric Vehicle*, is published and distributed free to all owners of electric vehicles and to merchants owning horse-drawn or gasoline trucks, 640 cars are cared for in public garages and 210 are garaged by their owners. In addition to these pleasure cars 37 commercial trucks are in service and 20 under delivery orders. In June, 1910, there were but three commercial vehicles in Denver. An increase of 300 per cent is estimated for the next two years. Denver has one electric pleasure car for every 217 of population. This is a higher per capita average than any other city in the United States.

The first paper of the evening session, entitled "National Co-Operative Advertising Campaign," was presented by Frank W. Smith, who is chairman of the sub-committee in charge. About $38,000 has been collected and a year's advertising been contracted for which will exhaust this fund. A list of the 101 subscribers comprising central stations, vehicle manufacturers, battery and accessory manufacturers is given, as is also the publications in which the advertising appears. This latter is made up of about 43 names divided into seven groups as follows: (1) general magazine, (2) fashion and social, (3) central-station magazines, (4) auto trade journals, (5) physicians journals, (6) trade publications, (7) popular electricity. Altogether 432 insertions were contracted for, the first appearing in May, 1912.

The Committee had in mind that the campaign was to be one of education, not devoted to any one type of vehicle or accessory. The first definite policy decided on was that the electric should be featured on its own merits and should not include disparagement of the gas vehicles. The next was to decide on a slogan. Two were selected. "Before you buy any car, consider the electric," and "Public interest and private advantage both favor the electric." These have been generally used. Suggestion and criticism from those subscribing to the fund was requested as of assistance to the Committee and the right of the subscriber and quotations from some letters already received

were presented. A number of slides illustrating the type of the advertisements appearing in the various classes were shown.

Discussion and criticism was entered into by Messrs. Mansfield, Baker, Robinson, Schiff, Marsh and a commendatory communication from the *Electrical World* was read. W. D. McJunkin gave some information about the preparation of the campaign and appealed for a continuation of the good work since the cumulative effect would be noticed in subsequent years.

Bruce Ford then presented a paper on "Some Recent Developments in the Lead Battery for Vehicles." Like every other part of the vehicle the battery is being continually improved as experience demonstrates weaknesses or shortcomings. During recent months these improvements include a new pillar strap connector which is now made by welding the copper and alloy together thus avoiding the development of high resistance in this part. Wood separators were formerly cut with the grain running lengthwise. Trouble has been practically eliminated by having the grain extend crosswise and the use of kinds of wood which resist the action of the electrolyte to a marked degree. Moss growth which caused partial short-circuiting, has been eliminated by the use of a vulcanized rubber sheath on the top and bottom frames of the positive plates.

Harold Pender and H. F. Thomson next presented a paper on "Notes on the Cost of Motor Trucking." In May, 1911, the electrical engineering department of the Massachusetts Institute of Technology was enabled, through an appropriation of the Edison Electric Illuminating Company, of Boston, to undertake a study of the economics of motor trucking. The work up to the present has been chiefly a collection of operating costs from users in the eastern part of the country. The report is very complete and shows painstaking study of detail. The subject is treated under several heads including service and road conditions, tires, repairs, battery renewals, electricity rates, gasoline, lubricants, garage expense, sundries, driver and helper, depreciation, interest, administration, insurance. Seven pages of tables are given which detail their collection of figures. In concluding they state that it is practically impossible to predetermine what will be the total annual cost of operating a truck of a given rating without knowing what will be the requirements of the service, the nature of the roads, and the general method of handling and caring for the cars.

Other information is being compiled by the Institute and it will be published from time to time for distribution. A copy of each of these bulletins will be sent gratis, upon request, to any one interested in motor trucking.

**Operating Records.**

C. W. White, of Boston, then read the report of the Committee on Operating Records. Until such time as a complete, satisfactory, co-operative report can be made the Committee recommends that the operating expense of electric vehicles be carried under three headings, i. e., Operating Charges, Fixed Charges and Overhead Charges. Operating Charges should be sub-divided into the following headings—Lubricants, Electricity, Battery Renewals, Tire Renewals, Repairs Material, Repairs Labor, Painting. Fixed Charges should be sub-divided into these headings—Garage, General Expense, Garage Labor, Sundries, Driver, Helper. Overhead Charges should be sub-divided as follows: Amortization, Interest, Fire Insurance, Liability Insurance, Administration. In the above arrangement the so-called operating charges are in general proportional to the mileage of the car and are directly comparable to similar expenses for gasoline vehicles. The fixed charges are independent of the distance traveled. The so-called overhead charges frequently do not exist as actual expenses, although insurance is generally charged directly against the vehicle. In addition to the record of costs, there should also be kept a system of operating records of the individual cars covering the following: First.—The history of every battery, including the date of purchase, use, life of plates, times washed or repaired, and miles operated. Second.—A tire record in which the history of each tire is kept, showing the miles operated and type of vehicle upon which tires were used. Third.—Wherever possible a performance record of the vehicle should be kept showing the data upon the work performed by the car, including such items as calls, pieces and weights delivered, whenever the work is such that these units may be used.

Attention was called to the fact that there are at present two other associations interested in the success of the electric vehicle, viz.: The N. E. L. A. and the Association of Edison Illuminating Companies. Each has appointed from time to time, committees to deal with this subject and while much valuable work has been done, nothing really tangible has been worked out. A recommendation was made that the executive committee of this association endeavor to have a co-operative report made by the three associations. On motion a resolution was presented and adopted embodying this recommendation.

**Wednesday Morning Session.**

"Conditions in the East and the Possibilities of the Electric Vehicle," is the subject of a paper presented by Stephen G. Thompson. He believes that the logical conclusion of those intimately connected with the industry is that electric commercial vehicles have increased in greater proportion than gasoline trucks. The future of the electric truck lies in the East where the densest population is to be found because this condition calls for the most extensive street freight movement. The favorable attitude of brewers, bakers, express companies and department stores was cited. In New Jersey at this time an overwhelming percentage of those now evincing interest in the electric power wagon are the present gasoline machine operators. He contends that this is an indication of the acknowledged limitations of economic operation of gasoline machines. The conditions in New Jersey can be taken as indicative of the general trend throughout the East. In twenty months the number of this type vehicle has increased from a mere handful to a quantity exceeding 20 per cent of the total power wagons now in service.

It is a rather astonishing fact that, with but few exceptions, all the largest power-wagons installations in the country are of the electric variety; that the "fleet" orders have been placed by those concerns whose experience has been considerable; that in one installation are more commercial wagons than the total number of all types represented in 31 states; that the combined electric vehicle of but 50 operators represents 10 per cent of the total power-wagon service of the country; that one express company depends almost entirely upon electric machines for its delivery service in eleven principal cities; that all this has been accomplished by less than ten active electric-vehicle makers in the face of agressive competition by nearly 300 makers of gasoline machines.

In discussion J. H. Hale called attention to the increasing use of the small industrial truck in warehouses and railroad depots. Mr. Blood called attention to the inability of vehicle manufacturers to take care of an increased demand for their output if the demand should reach the figure expected. Their capital is limited and they have at present all the business they can handle.

R. L. Lloyd spoke of the conditions in Philadelphia. Mr. Mansfield and Mr. Curtis spoke of comparisons of conditions in the East and the West. The latter thinks natural conditions are very similar but that the west lacks concentration of effort.

E. S. Foljambe then read his paper entitled, "Progress of Commercial Cars in America," with special reference to the electric truck. It is a significant fact that in the brief space of twelve years the automobile industry has risen from nothing to the third position of importance among American industries. Electric pleasure cars were made as early as 1893, but 1897 practically marks the beginning of electric commercial cars in this country.

The number of trucks of both electric and gasoline classes in use have been approximately:

| | |
|---|---|
| 1908 | 2,500 |
| 1909 | 3,288 |
| 1910 | 4,000 |
| 1911 | 14,000 |
| 1912 | 30,000 |

Mr. Foljambe thinks the electric truck is a competitor of the horse and not of the gas car. Advertisements often make this mistake. Each motor truck has its allotted field and permanent injury is done the industry when the advantages of one are extolled to the discredit of the other. It is the horse which is to be eliminated and not the gas or the electric. For a long time the commercial end was considered as a side line but it is expected the commercial end will soon outstrip the pleasure-car branch of the automobile industry.

Experience has shown that the life of an electric truck is from two to two and one-half times that of a draught horse in heavy service. This is an excellent argument for the timid investor who has been holding on to horse delivery. Among the advantages cited are the increased mileage, no attention while standing, unnecessary to feed at the noon hour, can be worked overtime in rush periods, can be relied upon on slippery streets or excessive heat, occupy less stable room, can be kept in the office or store building when a stable would be a nuisance.

The adaptations of the electric truck were enumerated and commented upon and examples of truck performance given. Among them was mentioned a seven-ton truck, which hauls all the coal used by the Hudson & Manhattan Railroad Terminal Building and which has displaced four three-horse teams. He also mentioned the industrial truck which is performing efficient service in buildings.

Unfortunately, records of truck performance are not kept by all truck users. He advised following the plan used by Pender and Thomson, where the record is divided into three headings, general, annual performance, and annual expense. It is the duty of every vehicle manufacturer, every agent and kindred organization to help the user keep such records. He promises the trade papers will give such records publicity if the others interested will supply the data. The paper was illustrated and also gave tables of cost of operation compiled by the Commonwealth Edison Company.

The subject of cost accounts and records was discussed by Professor Thomson, who explained the collection of data which had been referred to. Mr. Curtis thought that under repair charges the cost of repair parts should be separated from repair labor, since though one was fixed the other would vary enormously according to the ability of the workman. Mr. Scott thought that in formulating a system of records particular attention should be given to the desires of the truck user. They should be of a character to appeal to the firm who keeps the books and not be adopted solely for the benefit of records for the Association.

Attention was directed to the fact that a company of certified accountants were at the present time engaged in formulating a system for a large garaging business concern in Chicago.

A paper on "Electric Vehicle Battery-Charging Apparatus" was read by Robert E. Russell, of the General Electric Company. In dealing with the number of cars to be charged, different conditions are found, as follows: (a) The private garage limited to one car; (b) the average public garage, which starts on a small basis and yet should be able to charge any transient car which comes in, and (c) the large public garage, handling up to 200 cars.

In selecting apparatus to meet the various conditions, there must at all times be given strict heed to efficiency of the apparatus. First cost must be as low as possible for good apparatus; maintenance cost must be repected, and economy of floor space considered. For case (a) the rectifier or direct-current, rheostat is most suitable unless the voltage is too high with direct current, when a motor-generator should be used. For case (b) one or two rectifiers or direct-current rheostats except as before, if high-voltage direct current is supplied. Add rectifiers in various capacities until a large increase makes a motor-generator admissible under any condition of current supply. Case (c) is treated like (b) which has grown to larger proportions, banks of charging panel boards carrying switches and instruments being necessary.

The paper was illustrated with views of the various apparatus mentioned. Messrs. Mansfield, R. L. Lloyd, Holland, J. H. Hale and Russell entered into a discussion of the paper and brought out a comparison of efficiencies between alternating current and direct-current apparatus. Where either alternating current or direct current at 110 volts could be selected to charge a 30-cell battery a direct-current rheostat would prove more economical than a rectifier.

Reports of the sections in Chicago and New England were then read by George H. Jones of the former, and W. E. Holmes of the latter. Both showed a very healthy condition and encouraging membership.

Mr. Blase, who has charge of the delivery department of Peter Dolger & Company, New York brewers, was present and asked to give his experience. At an expense of $350,000 spread over a period of two years the company will convert its entire delivery to electric equipment. It still has two gas trucks which are in the repair shop 30 per cent of the time. There are now 58 electric cars which are taken care of in the garage by two men. Cost of delivery has been reduced from 35 cents per barrel to 15 cents per barrel, representing a saving of $80,000 yearly.

A recess was then taken to partake of luncheon at the invitation of the Edison Electric Illuminating Company of Boston.

### Wednesday Afternoon Session.

"The Edison Storage Battery in Service" was the title of the paper read by Harold H. Smith and illustrated by lantern slides. He referred to previous reports of laboratory tests which have been presented to the Association in former years and gave some results from actual performance from the field of duty. Mr. Smith briefly cited the history of the Edison battery development, and a description of the same, naming the several types and electrical characteristics. The Edison battery of the present type has now been in service very close to four years, which is the period covered by the guarantee and it has a clean record, not a single battery having failed where reasonable care has been accorded. Time has not yet revealed the limit of useful life. In the matter of boosting and quick charging, some very remarkable cases were recounted. Five times the normal rate of charging has been practiced regularly without detrimental results. There is a storage-battery car line in Washington where the car lays over for about five minutes at the ends of its route. During this time the battery is charged at five times its normal rate. The car covers about 215 miles per day and practically no time is lost in storing energy. A car on another road similarly treated covers 286 miles per day when the normal mileage is 80 on a single charge. Other abuses and accidents to which batteries are subject

received attention, together with its performance after idle periods and under low-temperature conditions. From the latter nothing is to be feared for a recording thermometer showed a temperature within the battery compartment of eight degrees below zero, and yet the battery operated with satisfaction. The electrolyte freezes about minus 20 degrees Fahrenheit. Several instances were also mentioned showing the excess capacity which the battery is capable of delivering. 450-ampere-hour batteries gave in one case 543 ampere-hours and in another case 550, nearly 25 per cent increase. The slides showed among other things, curves illustrating the various performances spoken of.

A paper entitled "The Electric Vehicle from an Insurance Standpoint," prepared by Carl H. Clark was, in his absence, read by Mr. Mansfield. It treated principally of the causes which have resulted in fires on the vehicle itself and explained the two styles of insurance policies termed "valued" and "non-valued." The various causes of loss were listed as follows in the order of their relative frequency and each was given consideration at some length with suggestions for elimination of the hazard: (a) Overheating of resistance coils by accidental throwing on of the current while the car is at rest. (b) Heat given off by resistance coils in ordinary use. (c) Short-circuit in wiring caused by water or snow. (d) Short-circuit in wiring caused by the chafing or bruising of the insulation. (e) Ignition while charging. (f) Damage to batteries claimed from rapid discharge by a short-circuit after a fire which has burned the insulation. (g) Damage to the batteries from the jar of a collision where the car itself suffers comparatively small damage.

Discussion of this paper was participated in by Messrs. Baily, Hewins, White, Thompson, Ostion and Smith. It was directed chiefly toward the desirability of an automatic device for cutting off all current while the car is at rest.

Alexander Churchward then read his paper on "The Standardization of the Electric Vehicle; Speed." In opening, referring to the previous subject of standardization, voltage, he said: "It is extremely gratifying to note that nearly all vehicles for 1912-1913 will be so equipped with batteries that the charging voltage will be from 78 volts on the smaller pleasure cars to 110 volts on the commercial vehicles and larger types of passenger cars." Particular attention was called to the increased power required for speeds above 20 miles per hour and curves shown illustrating this fact. The author thinks 20 miles per hour very fast for a car driven by women or children. The braking strain is 56 per cent greater at 25 miles, but in many cases the braking mechanism has not been strengthened in proportion where the latter speed was intended. In discussing speed with long established manufacturers the consensus of opinion showed they would welcome some standard maximum speed, if the different companies would stand by it. But because the salesman finds it easier to dispose of a car which will go faster than his nearest competitor, the speed has been increased from year to year. Tires have also an important bearing on the matter of speed and the various types and conditions have each their point of maximum efficiency. Beyond this point the energy rises rapidly.

Election of officers for the ensuing year resulted as follows:

President, Arthur Williams.
Vice-president, Frank W. Smith.
Secretary, Harvey Robinson.
Treasurer, Day Baker.

To fill vacancies on the Board of Directors: W. G. Bee, P. D. Wagoner, E. S. Mansfield, George H. Kelly, William H. Blood, Jr.

A vote of appreciation was then tendered Mr. Blood for his two years of labor and successful efforts as first president of the Association. In response Mr. Blood laid all success to the complete co-operation of all the members and the convention then adjourned.

The entertainment features included automobile tours on Tuesday afternoon, through the courtesy of the Electric Vehicle Club of Boston; a luncheon on Wednesday at which the Boston Edison Company was the host, and a theater party on Wednesday evening as the guests of the New England Section, Electric Vehicle Association of America. All delegates were given the freedom of the Boston Electric Show during the convention.

## Juvenile Electric Cooks.

Glasgow, at its latest Smoke Abatement Exhibition, hit upon an excellent plan for popularizing its electric heating and cooking demonstrations. The system being owned by the municipality, it was a matter of easy arrangement to organize, with the co-operation of the educational authorities, a series of electric-cooking competitions for school girls. This course not only trains up scores of electric cooks for the near future, but it sets children and family circles "talking," which really is half the battle when you have to popularize a good thing.

There are 2,000 electric motors operating in the Hotel Astor, New York City.

## REACTANCE AND HYSTERESIS.

### Discussion at Monthly Meeting of American Institute of Electrical Engineers.

The 276th meeting of the American Institute of Electrical Engineers was held at the Engineering Societies Building in New York City on the evening of October 11, with President Ralph D. Mershon in the chair.

The first paper presented was one by Malcolm Maclaren, entitled "The Effect of Temperature Upon the Hysteresis Loss in Sheet Steel."

### Effect of Temperature Upon Hysteresis.

Experiments are described in which the hysteresis loop at various temperatures was plotted by measuring the magnetizing field and the magnetic flux in two ring samples made up of sheet steel having a mean diameter of 26.7 centimeters and a mass of 3.99 kilograms. One ring was of commercial steel, the thickness of the sheets being 0.69 millimeter. The second sample was silicon-steel of thickness 0.35 millimeter. Primary and secondary windings of copper wire were insulated by means of mica, asbestos and Portland cement. An electric furnace was used for heating and the temperatured measured with thermo-couples. The method of slow reversals was used, the current being varied in the primary at such a rate as to give a constant deflection upon the galvanometer connected to the secondary. The galvanometer reading together with the time necessary for any step is sufficient to determine the change of flux during that step. Hysteresis loops were determined at various temperatures from 25 up to 777 degrees centigrade, and the result in watts per kilogram, corrected to correspond to a definite flux-density in each case, shows a gradual decrease with ascending temperature. With commercial steel the hysteresis did not quite reach zero at the highest temperature. With silicon-steel it became zero at 745 degrees. A slightly different critical temperature was obtained with rising and with falling temperature, and, moreover, the critical temperature did not appear very definite. At temperatures below the critical point the results during heating and cooling coincide. Only one run is reported upon each sample, the flux-density being about 10,000 gausses at the start.

A written discussion on this paper by L. W. Chubb was read by C. F. Scott. Mr. Chubb referred to experiments which he had made to determine the effect of temperature upon hysteresis. The hysteresis at ordinary temperature was measured before and after heating, the heating being carried on according to a variety of definite cycles. A pause in temperature at some values has no effect on the loss, while at others it will raise the loss and at still others it will lower the loss. Again, although such holding of temperature may not change the loss at one temperature of meas-

urement it will change the loss at others. In his test the ring sample was heated by placing it over a large transformer core so that it formed a short-circuited secondary. The temperature thus obtained was very uniform and easily controlled.

W. S. Moody presented a paper entitled "The Use of Reactance in Transformers."

**Reactance in Transformers.**

Until recently reactance in transformers was considered an objectionable characteristic except in the constant-current transformer for arc lighting. In connection with larger units and generating stations and higher voltages, however, a short-circuit may result in an enormous current, the natural remedy for which is to place reactance in the transformer. This paper discusses how reactance can be introduced into transformers, and points out some of the difficulties and limitations. Reactance is due to leakage flux and is expressed as the percentage of the total flux, which the leakage flux constitutes. The principal difficulties in obtaining high reactance are the increase in mechanical strain under overloads, the extra loss in the conductors due to eddy currents dividing the windings. In constant-current transformers variable reactance is needed and high reactance is obtained without high density in the leakage flux by providing a large cross-section for the leakage field. This method is expensive and is prohibitive in large units. It is impractical to get more than eight per cent reactance in 60-cycle transformers, and the allowable maximum is less than this on low voltage. It is customary to specify a reactance of not less than five per cent to protect the system against excessive currents. The mechanical stress on the windings depends not only upon the inherent reactance but on the external reactance. If the latter is low, the transformer with low inherent reactance will have the larger mechanical stress, but for external reactance above one per cent a transformer with five per cent inherent reactance will suffer greater mechanical stress than one with two per cent. In an auto-transformer it is a more difficult problem to obtain sufficient reactance. A method of obtaining reactance by placing laminated iron between the primary and secondary so as to form a path for leakage flux was described, with diagrams illustrating the construction for both core-type and shell-type transformers. It is necessary to have air gaps in this iron path. The reactance may be increased almost without limit by giving a proper section to this iron path. A large current-limiting reactance having a concrete core is also illustrated. The loss in the magnetic shunts varies with the load and affects efficiency as if it were a copper loss. It is small, however, as the weight of the shunt is small compared with the core.

The discussion was opened by Philip Torchio, who described a design of reactance using a pan-cake winding, instead of the drum winding of Mr. Moody, and an inclosed case and supports of fireproof insulating material. An advantage of the pan-cake coil is that for the same floor space it is not so high as an equivalent drum-wound reactance, owing to the fact that the windings and layers can be placed closer together for the same potential gradient between layers. The reactance for a given number of turns is greater the shorter the coil. Consequently, for the same reactance and same floor space, the coil is only half as high. There is consequently less leakage of flux, less eddy-current losses and a shorter conductor, giving less heating and better efficiency. Porcelain arms are used for the supports and alberene stone for the central core. The inclosing wall is of porcelain segments. The cellular structure affords natural ventilation. Heavy concrete headers form the two ends and are fastened to the wall by brass bolts. The conductors are insulated throughout to prevent short-circuits. A table of the constants for a set of reactances operating on three 20,000-kilowatt, 6,600-volt, 25-cycle generators of the New York Edison Company was given.

C. A. Adams spoke on the question of mechanical strains in the case of large transformers and reactance coils, and showed why they increased more rapidly than the linear dimensions.

D. B. Rushmore said that the large power stations of today concentrated so much energy that the destructive effects are no longer controlled by the natural characteristics of the apparatus, and we have had to introduce artificially into such machines and systems qualities which previously we endeavored to keep out. Introducing reactance into transformers brings in the possibility of a serious rise of potential, especially with high-frequency currents. This is one of the reasons why in generators it is desirable to put the reactance outside.

W. M. McConahey submitted a written discussion which was read by H. W. Flashman. There is a wide-spread impression that merely changing the design so as to increase the reactance will reduce the short-circuit stresses. This is only true within limits, and in some cases an increase in reactance will increase the stresses. At 60 cycles it is not difficult to proportion the design to resist the most severe short-circuit conditions, but for 25 cycles the problem is much more difficult, especially if the voltage is low. In a recent case of a two-to-one transformer for railway service, the short-circuit stresses were found to be so large that it was decided to mechanically separate the primary and secondary windings. This increased the cost of the transformer, but was cheaper than supplying outside reactance. Exceedingly low reactance, giving close regulation on inductive load, not only makes it difficult to brace the coils securely, but also increases the cost. He had used laminated iron between primary and secondary coils to secure high reactance as far back as 1899 and found it entirely successful. This scheme does not, however, entirely shield the copper from eddy currents.

Charles F. Scott stated that on short-circuit the magnetic shunt would have to be of very much larger cross-section in order to maintain high reactance as the iron approached saturation.

H. M. Hobart said that alternators and transformers were formerly made more expensively and less satisfactory than they need have been in order to keep the reactance low. Now the tendency is to make them still less satisfactory and more expensive in order to make the reactance higher than is natural. He favored making the transformer of as good a design as possible from the standpoint of heating and efficiency and add any necessary reactance externally.

M. V. Ayres opposed the latter idea from the point of view of substation operation, owing to the fact that it was not easy to find the necessary space for mounting an external reactance.

W. S. Moody in closing the discussion stated that iron could not be used advantageously as the core of a reactance because on short-circuit it would be over-saturated and the flux in air would have a density almost as great as in iron. The concrete core is not reinforced. The insulation used is treated wood.

The president announced that there would be a mid-winter convention in New York City in February, at which the general subject of the rating and testing of electrical machinery and apparatus would be discussed. Papers for this meeting should be submitted to the Standards Committee before January 1.

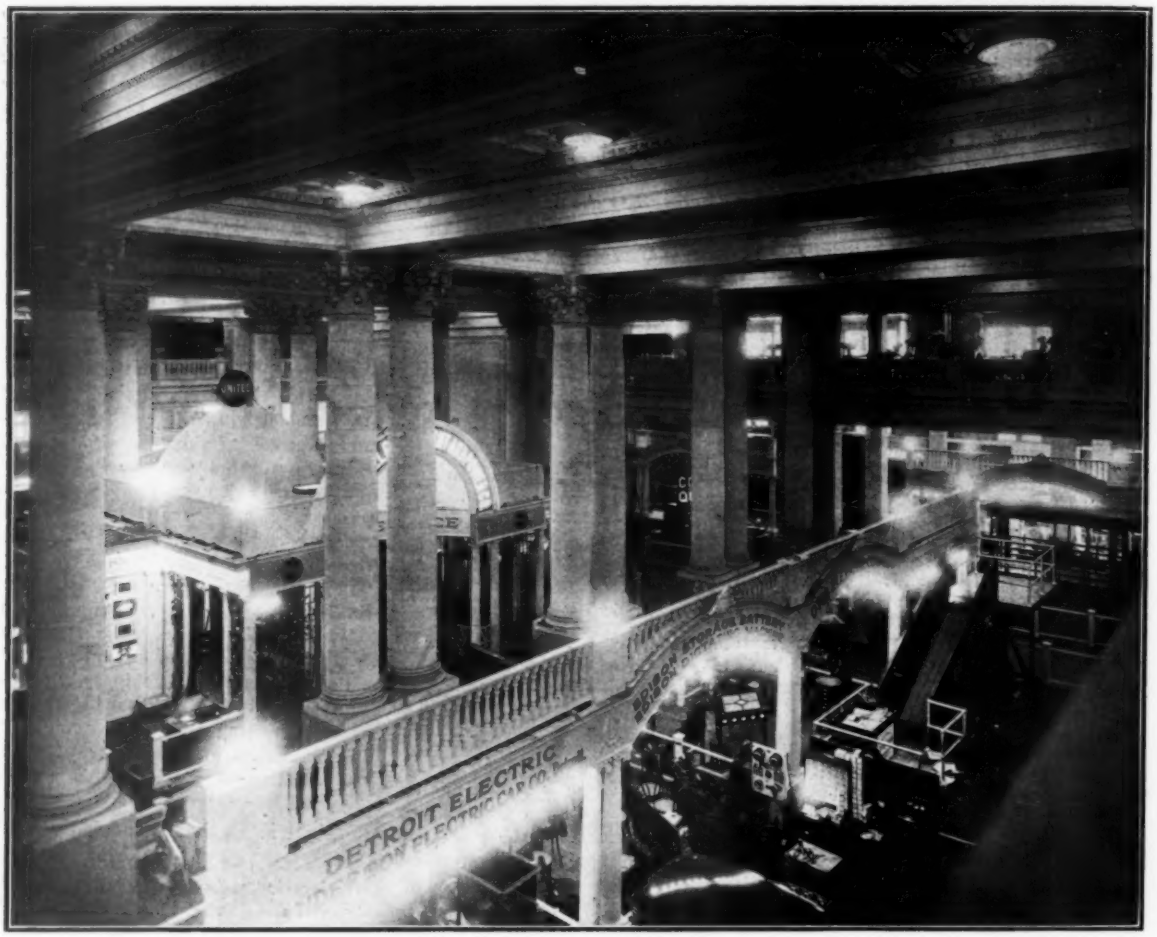
## Electric Railway Casualties.

The total number of train accidents on electric railways in the United States during the three months of January, February and March, of the present year was 81, in which 347 passengers were injured but none were killed; 5 employees on duty were killed and 47 injured, and 9 employees not on duty were injured, making a total for the 81 wrecks of 5 persons killed and 403 injured.

Of the 45 collisions that occured during those three months 26 were rear end, 10 butting and 9 miscellaneous. Out of the 34 derailments 11 were due to defective roadbed, 5 to defects in equipment, 4 to negligence of train or signal men, 4 to track obstructions and 10 miscellaneous.

# New York Electrical Exposition and Automobile Show.

The 1912 New York Electrical Exposition was opened at the Grand Central Palace on the afternoon of October 9 by a luncheon given in honor of Thomas A. Edison. This luncheon as mentioned in our last issue, was attended by about 400 men prominently identified with the electrical industry and was an appropriate opening for the show, which will run until October 19. The show is given under the auspices of the New York Edison Company, and much credit is due the management and their very efficient staff of engineers for the satisfactory results obtained. About 25 per cent more space is used this year than was used in 1911, and the attendance has been very satisfactory.




General View of New York Show.

One of the notable exhibits of the electrical show is that of the wireless telegraph plant which has been installed by the United States Navy school of wireless telegraphy. There is an antena, 65 feet tall on the roof of the exposition building. It was announced that the first wireless dispatch from New York to Panama would be sent from this station.

Other features of the naval exhibit consist of electrical appurtenances standard in the Navy, nearly all of which are water and steam proof. Relics of electrical installations recovered from the U. S. S. *Maine*, destroyed in Havana harbor in February, 1898, are shown, together with parts of the dynamo which was in operation at the time of her destruction. For demonstration purposes an Oudin transformer, constructed by the students, is used. This is capable of developing 1,000,000 volts, and consists of a 15-kilovolt-ampere transformer, glass plate oil-immersed condenser, and a rotary spark gap; 30,000 volts are used in the primary, and the high-frequency transformation is accomplished by the large coil.

The War Department has on exhibition a working model of the Gatun Dam, loaned by the Isthmian Canal Commission. The model shows on an accurate scale a large section of the Canal Zone. It is especially designed to demonstrate the operation of the locks and spillway.

Another timely exhibit by the War Department is a working model showing how the aeroplane may be used in war. There is a miniature harbor with mines and batteries and an enemy's ship is trying to pass through. The ship is being cannonaded by the guns on shore and an aeroplane is brought into use above the vessel. This exhibit was originally constructed to be shown at the Alaska Exposition.

How electricity is used in the stimulation of plant growth is illustrated by a demonstration under the direction of the Department of Agriculture. In a greenhouse flowers are shown in process of stimulation of growth. For this purpose a machine sends a current of

100,000 volts through a mesh screen. In contrast with the plants affected by the current of electricity is a bed growing under normal conditions.

The problems that must be solved and the methods that are followed in supplying electric light for 130,000 customers in Manhattan and The Bronx make up part of the exhibit of The New York Edison Company. By means of photographs, models, charts and diagrams, an attempt has been made to convey some idea of the magnitude of the work that this company carries on. For instance, there are now about five and a quarter million incandescent lamps and forty thousand arc lights burn up 3,000 tons of coal each day. One thousand and five hundred miles of cable distribute the current throughout the city, and 5,000 employees look after the details of the company's business.

Forty or more charts show the growth of the company during the past 30 years; another exhibit shows how complaints are handled, and explains some of the factors that cause fluctuations in lighting bills; the advertising methods of the company are shown in part through the issue of a daily newspaper, which also demonstrates the use of electricity in the print shop; night views taken by the Photographic Bureau, and famous all over the world, hibit centers in the old "Jumbo," which generated the current that supplied the first electric light in New York, more than 30 years ago. This is the original machine, and the only one that escaped the fire that destroyed the old Pearl Street station in 1890.

The Edison Electric Illuminating Company of Brooklyn, in a most interesting exhibit, is demonstrating the industrial advantages of the borough, and showing its many conveniences and attractions for manufacturing purposes. These advantages include an extensive waterfront, excellent terminal facilities, proximity to great markets, abundant labor, sanitary, well-located loft buildings at reasonable rents, and cheap electric power.

**Portion of Exhibit Hall.**

on the company's lines, while power is supplied for almost 340,000 horsepower in motors. At the present moment these motors are building the aqueduct and subway, hoisting the material for the Woolworth building, supplying the power that maintains the high pressure for fire fighting and driving the machinery in innumerable industrial establishments. And all this current is generated in two big buildings on the waterfront, at the foot of East Thirty-ninth Street, where the great furnaces are shown, while the Illuminating Engineering Bureau has an interesting exhibit of fixtures and shades. Another exhibit is of the work of the Edison School, which was established last year for the employees of the company.

There is also a reception room, where the friends of the company are received, and in connection with this is the electric tea room, the electric laundry and the commercial electric kitchen.

Historical interest in the Edison ex-

The main feature of the exhibit is a panoramic view, in colors, showing the waterfront. The view is 100 feet in length and covers also an entire side of the exposition hall. All the great enterprises on or near the waterfront are produced in miniature, the commercial and industrial developments of the borough appear, and the streets, homes and public buildings are shown in the background. The color and lighting

effects add realism to the picture. No pains or expense have been spared to make the presentation accurate and beautiful.

In preparing the exhibit the company has had the co-operation of the borough government of Brooklyn, the Department of Bridges of the City, the Bush Terminal Company, the New York Dock Company, the Eastern District Terminal Company and other large organizations.

In connection with the electrical show there is a large array of electric vehicles, for pleasure and commercial use on view, these being shown on the third floor of the building. The tenlap track, which surrounds the third floor, has been arranged to give the general aspect of "out of doors"—a hedge fence, plenty of fresh air through the open windows, and a traffic "cop" adding to the realism. On this track, which is wide enough for cars to pass, with plenty of spare room, the manufacturers of pleasure vehicles and trucks are backing up their statements with actual indoor demonstrations of the merits of electrics.

In connection with the track is shown the equipment that belongs in an electric vehicle garage, the parking space being fitted with four charging plugs and the necessary paraphernalia for caring for the machine. A course of vehicle instruction is also given at this garage, while prospective purchasers are taught the operation of the cars. For the women who are interested in automobiles these demonstrations are given by Mrs. Alice E. Waxham, who recently established an automobile business, catering exclusively to needs of New York women.

A list of the exhibitors with brief descriptions of the exhibits maintained follows.

**American Clay Products Company,** New York, is showing a complete line of sample sections of vitrified conduit for underground distribution work.

**Anderson Brothers,** Paterson, N. J., have an interesting demonstration of the spinning of silk. On a special loom silk handkerchiefs are made and in each handkerchief is woven in colors, the picture of Betsey Ross planning the first American flag. A single operator tending the loom makes three handkerchiefs an hour, while a half horsepower motor drives the machinery.

**Bell Electric Motor Company,** Garwood, N. J., is showing a number of self-starting single-phase motors and a complete line of two-phase machines. A series of efficiency tests are carried on at the exhibit. F. R. Bell is in charge of the exhibit.

**Boston Pencil Pointer Company,** New York, shows a motor-driven pencil sharpener and also several styles of hand-operated machines.

**Brunswick Refrigerating Company,** New Brunswick, N. J., has on exhibition a two-storage compartment electric refrigerator. The equipment exhibited is designed especially for the home. The refrigerator is provided with two storage compartments in which a temperature of 10 to 15 degrees below that obtainable with ice is easily maintained. A compartment is attached in which 15 to 20 pounds of ice may be frozen for table use, ice cream, etc.

**Burroughs Adding Machine Company,** New York, is showing a number of its adding machines equipped to be operated by motors.

**Canton Rubber Company,** Canton, O., exhibits rubber gloves and goods for electrical use, and also rubber materials of a general nature. E. O. Jeralds is in charge.

**Comptograph Company,** Chicago, shows electrically operated calculating machines. Hand-operated machines are also exhibited.

**Consolidated Telegraph and Electrical Subway Company,** New York, is displaying models and photographs of manholes, and methods of underground distribution in New York City.

**Croker National Fire Prevention Engineering Company,** New York, shows charts showing the annual losses in this and other countries· fire extinguishers, fire escapes, fireproof furniture, etc.

**Cutler-Hammer Manufacturing Company,** Milwaukee, Wis., shows a complete line of electric heating devices consisting of those devices used in the home, such as laundry irons, toasters, disk stoves, plate warmers and air heaters, and apparatus used in various industrial fields, such as the tailoring industry, hat manufacturing, the printing and publishing trades, and candy manufacturing. A feature of the exhibit is the new radiant-type table toaster embodying several new features. The company is represented by A. B. Hubbell and F. D. Goode.

**Dalton Adding Machine,** Popular Bluffs, Mo., is exhibiting electrically operated calculating machines.

**Decorus Manufacturing Company,** New York, is exhibiting the aerograph, a device for spraying paint on delicate fabrics. Compressed-air supplies the necessary pressure.

**Edison Storage Battery Company,** Orange, N. J., shows among the various types of the Edison storage batteries, the 60-cell A-4 150-ampere-hour battery; the 60-cell A-10 375-ampere-hour battery; the 40-cell A-6 225-ampere-hour battery, and the 25-cell A-8 car-lighting battery. There are also shown an assortment of Edison cells, two voltage regulators, such as are used in stationary lighting plants, an alternating-current Edison rectifier, and a large exhibit board. N. C. Durand, H. R. Leisk, C. E. Foster and W. G. Bee are in attendance.

**Electric Controller & Manufacturing Company,** Cleveland, shows among several types of controlling apparatus, one designed especially for machine tools. It automatically starts, stops or reverses the motor at a single throw of the control handle. The action of the brake is dynamic, and the device limits the current input to the size of the motor. Automatic starters for pumps and a new line of hand-starters and drum-controllers are also being demonstrated. R. G. Widdows and M. D. Goodman are present.

**Electric Storage Battery Company,** Philadelphia, shows three cells, such as are used in New York, and an end-cell switch. In contrast with this is an earlier battery of the type used when storage batteries were first installed by central-station companies. Plates from a cell of the 1895 model and an end-cell switch of the same period show the development of this feature of the lighting industry. There are also shown cells of all the different types manufactured by this company, ranging from the smallest laboratory type in glass jars to the cells in lead-lined wooden tanks. "Exide" batteries for electric-vehicle service are included in the exhibit. Albert Taylor, W. O. Knudsen, D. P. Orcutt, W. B. Bowie and R. Whitehurst are in attendance.

**Electric Testing Laboratories,** New York, displays the methods employed in testing paper to determine its tensile strength and its toughness. There are also shown the methods used in testing fuel. Of historical interest are the exhibits showing the development of the watt-hour meter, and the illuminating shades and reflectors. The meter exhibit shows the type first used by Edison thirty years ago, known as the electrolytic meter, and from which has been gradually developed the meter in general use today. In the shade and reflector exhibit are shown samples that have been obtained from nearly every manufacturer in the country, and besides the shades of modern design are shown some of a period of ten years ago. The difference between these two collections shows the tremendous advance that has been made in the lighting field in that brief time. W. S. Howell, J. D. Burby, and C. H. Sharp were present.

**Ensign Manufacturing Company,** Boston, is showing a line of motor-driven calculating machines.

**Eureka Vacuum Cleaner Company,** New York, shows in operation electrically operated vacuum cleaners for household service.

**Eureka Vibrator Company,** New York, has on exhibition electric vibrators designed for either direct or alternating-current circuits for operation from central-station and battery circuits.

**Federal Sign System (Electric),** Chicago, shows various sample signs and accessories, power tables, vacuum cleaners, and fittings. The company is represented by W. Warren Tower, L. E. Spurrell, William McCurdy, C. B. Graves and S. D. Levy.

**General Acoustic Company,** New York, is showing dictagraphs and an acousticon with electrically controlled sound regulation.

**General Electric Company,** Schenectady, N. Y., has an elaborate display of incandescent lamps of all types and sizes. In addition to the lamp exhibit are cooking devices, and a color-matching outfit that gives a light that is the nearest approach to daylight of any artificial illuminant. In another part of the exhibit are shown motors of various types up to 7.5 horsepower, for industrial applications, and smaller motors that are used for office application, such as the operation of fans or sewing machines, or a jeweler's grinder or buffer. W. H. McLaren is in charge, assisted by B. C. Sprague, J. T. Alexander, A. G. Sandeen and J. W. Morton.

**Gould Storage Battery Company,** De-

pew, N. Y., shows the batteries used by electric vehicles, parts of the batteries used for driving submarine boats, and the standby plates that are used in maintaining the load by central-stations. Vehicle batteries, and those used in storage-battery cars, are shown complete, a number of cells being connected, and set up in trays; but the other batteries are so large that only parts are exhibited. There is also shown the gasoline-driven generator and the equipment that goes with the house lighting plant. W. S. Gould, G. Hayes and H. R. Earley are present.

**Grosser Knitting Machine Company,** New York, shows a new hosiery machine in flat-bed construction, which provides by means of a new widening device a full fashioned seamless stocking, in cotton, lisle, mercerized or silk.

**Gudeman & Company,** New York, maintains an interesting exhibit of the electrical novelties that are used for decorative purposes. Electrical flowers, with bulbs imbedded in the petals and wires cleverly concealed in the stems, are used for table decorations, the silk lamp shades may be used for many purposes, while some of the most beautiful of fixtures are the carved wood electroliers. In the Gudeman exhibit are about fifty examples of electrical methods of decorating.

**Habirshaw Wire Company,** Yonkers, N. Y., shows wires and cables of all kinds, from the light wire that is used for electric fixtures to the heavy lead-sheathed cable over which high-tension current is transmitted. R. S. Satterle, J. B. Olsen, H. E. Stevens and W. J. Metz are in attendance.

**Wallace B. Hart,** New York, shows the Copeman automatic electric cook stove and the Dodge & Zuill easy motor washer.

**Helion Electric Company,** Newark, N. J., is displaying the well known line of Helion luminous toasters, two heat flatirons, and radiant cigar lighters. These are equipped with the Helion heating element, a chemical product, produced at white heat, which is almost indestructible. Max Lowenthal is in charge.

**Hurley Machine Company,** New York, has on display a complete electric home-laundry equipment comprising the Thor washing machine and electric dryers and ironing machines.

**Independent Electrical Supply Company,** New York, is distributing literature descriptive of the various electrical supplies and devices handled by the company.

**H. W. Johns-Manville Company,** New York, shows the Audiffren Singrun refrigerating machine for household use and a line of asbestos, building material, shingles and stucco, while among the electrical specialties are shown "Noark" service boxes for the protection of power and lighting circuits, J-M dry batteries, friction tape and molded insulation, and the J-M. Linolite system of lighting.

**Kalor Company,** New York, has on exhibition an instantaneous electric hot-water heater.

**Kinetic Engineering Company,** Philadelphia, is demonstating two types of the so-called "Electric Sexton." The Kinetic organ blower is operated by an electric motor, which drives a shaft on which are mounted a series of fans.

**The Lighting Studios Company,** New York, maintains a display of Doricware, comprising the complete line of different sized reflectors. diffusing spheres, indirect lighting units and hemispheres and special decorative globes.

**Lux Manufacturing Company,** New York, exhibits an incandescent lamp, with a flexible tungsten filament, instead of the usual continuous drawn wire. These lamps are sold under the trade name Flex-Luz, and they range in size from the two-candlepower lamp, with its hourly consumption of two and a half watts for sign work, to the lamps rated at 500 watts.

**Mail-Om-Meter Company,**. Detroit, is displaying electrically driven sealing and stamping machines for office purposes.

**Meacham Addressing Machine Company,** New York, has an exhibit of addressing and wrapping machines.

**Metropolitan Engineering Company,** Brooklyn, N. Y., exhibits meter and service protective devices, high-tension fuses and cut-outs, and protectors for transformer secondary networks.

**Mead-Morrison Manufacturing Company,** New York, exhibits a one-sixth-ton orange peel grab bucket, connected to a double-drum electric hoist.

**Monarch Vacuum Cleaner Company,** New York, has a number of demonstrators pointing out the advantages of its vacuum cleaners, which are shown in operation.

**Philip Morris & Company, Ltd.,** New York and London, is exhibiting a miniature tobacco plantation and cigarette factory and a complete line of its products.

**J. L. Mott Iron Works,** New York, shows a number of lighting standards of the type generally used for street and park illumination. There is also shown a model of the standard, prepared especially for the General Electric luminous arc light, and another of the type designed for the Flatbush Gas Company, of which two hundred were recently installed on the Ocean Parkway, between Prospect Park and Coney Island, Brooklyn. There is also shown the new braclet arm type, adopted by The New York Edison Company for street installations, and the five-light tungsten posts for decorative street lighting in Brooklyn. In addition to the lighting standards, there is shown an example of an electric display fountain and other ornaments manufactured at the Mott Iron Works.

**National Electric Lamp Association,** Cleveland, shows National Quality Mazda lamps of all sizes and styles. Lamps for voltages ranging from two to 220, giving light from one to 440 candlepower are shown. The historical exhibit shows the progress of lamp development from the old Goebel lamp of 1870, to the National Quality lamps of the present day. A section of the racks on which the lamps are burned while under test at the Engineering Department laboratories is also shown.

**Nelson Valve Company.** Philadelphia, shows bronze, iron and steel valves designed for the severest service and built to withstand the highest pressures. There is also a working demonstration of a valve with an electrically operated floor stand; and a working demonstration of valves electrically driven in batteries, with individual mechanical control. A full size sectional Nelson Seatless Blow-off Valve shows every feature of design, demonstrating how it is maintained tight.

**New York Electrical School,** New York, is showing photographs of the school and exhibits of work done by the pupils.

**New York Steam Service Company,** New York, is exhibiting photographs of buildings furnished by steam from its mains and managed by its supervision bureau.

**Dr. Emilio Olson** is exhibiting a model of his scientific farm.

**Otis Elevator Company,** Yonkers, N. Y., demonstrates its reversible inclined elevator for carrying either passengers or freight from floor to floor in either direction.

**Pass & Seymour,** Solvay, N. Y., shows the newest types of brass shell sockets and receptacles and porcelain sockets and receptacles, a line of conduit box receptacles and the Shurlock locking devices.

**Philadelphia Storage Battery Company,** Philadelphia, shows the contrast of some of the early types of storage battery with those of the most recent date. These illustrate well the development of the battery during the past six years. In the exhibit there are also shown plates, groups, batteries and the Diamond Grid, as well as curves and figures.

**The Regina Company,** Rahway, N. J., it exhibiting four models of the Regina vacuum cleaner. Two of these are motor driven, one of the pump type, being used for cleaning office buildings and large homes, and a smaller model, which is rolled over the floor, gathering dirt in a bag suspended from the handle. Of the hand models, one is operated by means of a lever, which acts on the pump, and the other is pushed over the floor, after the manner of the carpet sweeper.

**Rex Sales Company,** New York, shows the various goods manufactured by the Vulcan Electric Heating Company and the Brokaw-Eden Manufacturing Company. This exhibit includes soldering tools, branding irons, cancapping and crown branders, wax melters, electrotypers' tools, the felt burner, domestic flat-irons, curling irons, hot plates, the Eden washing machine, and the L B Allen soldering plugs and solder-set.

**Roneo Company,** New York, exhibits letter copiers, pencil sharpeners, a new filing system, an envelope opener, typewriter ribbons, a "memoweight," and a telephone tablet. The letter copier is motor driven, the letters being impressed on a fibre sheet in passing over a revolving cylinder. The electric pencil sharpener is for use in large offices and for pencil manufacturers. Hand-driven sharpeners, as well as hand letter copiers, are also shown.

**Rosenfield Manufacturing Company,** New York, shows the Magic electric suction cleaner, equipped with a special guaranteed Westinghouse universal motor, designed especially for the work it has to perform. In connection with the demonstration of the "Magic" is shown one of these motors that in a breakdown test has been running for 2,500 hours, and in that time not a single repair has been made, no brushes have been replaced, and the commutator shows no preceptible wear.

**Runkel Brothers (Inc.),** New York, have on exhibition a working demon-

stration of the machinery by which chocolate is made.

**Shannon Manufacturing Company,** New York, is showing domestic laundry equipment, including washers, dryers and irons.

**Shelton Electric Company,** New York, is exhibiting its various vibratory massage machines, hair dryers and therapeutic devices.

**Simplex Electric Heating Company,** Cambridge, Mass., through its New York agent, Roger Williams, makes a comprehensive display of its electric heating and cooking apparatus.

**Standard Electric Incubator Company,** New York, has a line of electric incubators and some of its live products on exhibition.

**Stock Quotations Telegraph Company,** New York, is showing a number of tickers in operation on its regular circuits.

**Straight Filament Lamp Company,** New York, displays, in addition to its lamps, different types of reflectors and fixtures.

**Terry Steam Turbine Company,** Hartford, Conn., shows small vertical and horizontal steam turbines connected to motors and the rotor of a turbine unit.

**William Truswell & Son,** New York, are showing photographs of electrical contracting work done by them.

**Twin Volute Pump & Manufacturing Company,** Irvington, N. J., is showing a number of motor-driven turbine pumps.

**Universal Electric Welding Company,** New York, has on display a number of Thomson welding machines, in addition to a display board containing samples of welded products.

**Vacuna Sales Company,** New York, is demonstrating the "Vacuna" turbine vacuum cleaner, which is fitted with a "universal" motor.

**Wagner Electric Manufacturing Company,** St. Louis, shows the Wagner converter, with switchboard panel, just as it is sold, and ready for changing commercial alternating current to direct current, for charging storage batteries. There is also shown the Wagner rectifier, for changing commercial alternating current to direct current at six volts, for charging automobile lighting and ignition batteries. In addition to this, there are shown a 5-horsepower, 60-cycle, 220-volt unity power-factor single-phase motor, a 2-horsepower Wagner standard single-phase motor, and a 5-horsepower two-phase motor, and the line of Wagner switchboards and portable instruments.

**Westinghouse Electric and Manufacturing Company,** Pittsburgh, shows the Weldwell solder; a complete line of heating devices for both industrial and domestic use, including the sauté pan and the frying pan; a line of industrial household motors, including the general utility motors, which may be put to many applications; fans, and an interesting exhibit showing the process of the manufacture of the wire-type tungsten lamp. Of interest to automobilists is the exhibit of vehicle motors, with the controllers and rheostats and the tire vulcanizer, which has greatly simplified the problem of repairing tires.

**Weston Electrical Instrument Company's** exhibit includes a full line of direct and alternating-current instruments of both switchboard and portable type. Transformers of Weston manufacture, are shown for the first time. These are of the sealed type, no oil being used, and have extremely high insulation. Four of five exhibition switchboards are mounted with instruments of all standard types. The fifth board has 65 of the company's new miniature type of voltmeters mounted on it. These are all in operation and show the dead beat features of this instrument to great advantage. A demonstration switchboard is also displayed connected with a miniature power plant for operating the new types of alternating-current volt meters, ammeters, watt meters, power-factor meters and synchroscopes.

The show-case display includes standard precision instruments of the portable type. Considerable space is also given to the new miniature voltmeters and ammeters. The instruments are masterpieces of mechanical and electrical work, and neither pains nor expense have been spared to make them the most durable and reliable instruments for all kinds of service in which small direct-current instruments are useful or necessary. About 300 different ranges and models of these small instruments are made. Exhibit was in charge of C. P. Frey, assisted by W. N. Goodwin, K. M.Lederer, B. P. Romaine, J. C. Vogler and J. C. Bank.

### Vehicle Exhibits.

**Anderson Electric Car Company,** Detroit, shows the new Detroit Electric, clear-vision brougham, a car with ample accommodation for five persons, in which all the passengers face forward. The driver occupies one of the front seats, thus having an unobstructed view of the road. There are several other new features of construction in this car. The ladies' victoria, the limousine and the roadster, of the 1913 models, are also shown, while a two-ton truck, a roadster and a coupé make up the balance of the exhibit.

**Atlantic Vehicle Company,** New York, shows the chassis of the one-ton truck. In addition to the chassis shown there are photographs of other models and charts showing estimated operating costs.

**Baker Vehicle Company,** Cleveland, O., displays the new model brougham, with the wheel steer, and all passengers facing forward. This and the coupé and victoria make up the pleasure car exhibit; while the chassis of the two-ton truck, that is used by the American Express Company, and a general service wagon, which was brought out during the past two months form the commercial wagon exhibit.

**S. R. Bailey Company,** Boston, exhibits the Bailey roadster. The roadster has a record of covering eighty miles in four hours, while a year ago it made the trip from Boston to New York in a little more than twelve hours.

**Buffalo Electric Vehicle Company,** Buffalo, is showing several models of "Buffalo Electric" vehicles.

**Champion Electric Vehicle Company,** New York, shows a shaft-drive, one-thousand-pound wagon that takes the place of the single-horse delivery wagon. In addition to this thousand-pound wagon, is shown the chassis of the one-ton chain-drive wagon.

**Cleveland-Galion Motor Truck Company,** Cleveland, shows a truck, designed for hauling freight and baggage at railroad stations, in warehouses and on steamship docks. This truck is controlled and driven through all four wheels, making it possible to run the truck through the most congested places.

**General Motors Truck Company,** New York, which recently organized its electric-vehicle division, is showing only the chassis of the five-ton truck. This is on the main floor, and instead of giving demonstrations on the track, the car is jacked up so that the operation of its controlling apparatus may be shown. The battery of this car is carried above the frame, while the controlling apparatus, the switches and the meters are under the hood, at the front of the car.

**General Vehicle Company,** Long Island City, has on exhibition a truck just built for Arnold, Constable & Company. It is of three-and-a-half-ton capacity, and will be used by the wholesale department of this firm for the delivery of goods to the city trade. Another, is one of three one-thousand-pound wagons for the service of Black, Starr and Frost. The General Vehicle Company has been building commercial trucks for the past twelve years, but it has only been during the past few months that the industrial truck has been marketed by the company. A two-thousand-pound industrial truck similar to those used on the piers of the Mallory S S Company is shown.

**Lansden Company,** Newark, N. J., shows four models of the commercial cars, built by the company. These are the 1,000-pound and 3,000-pound wagons and the two and five-ton trucks. They are all the improved 1912 model.

**Studebaker Corporation,** Detroit, Mich., shows a five-ton brewery wagon, loaned by George Ehret. This truck was designed especially to haul the loads peculiar to the brewing industry, and it has a radius of 45 miles, at about eight miles an hour. There is also shown the 1,000-pound delivery wagon, such as is used by many retail merchants, and the 1913 Studebaker two-ton truck.

**Ward Motor Vehicle Company,** New York, exhibits two commercial wagons; one is the 1,000-pound wagon, designed especially for the delivery of bread, and is of the type used by the Ward Bread Company. The other is a 2,000-pound delivery wagon, used by the Edison Electric Illuminating Company, of Brooklyn.

## Next N. E. L. A. Convention in Chicago.

At a meeting of the Executive Committee of the National Electric Light Association held on October 11 it was decided that the next convention of the Association will be held in Chicago, Ill. The third week in May or the first week in June, 1913, will probably be selected as the time for the convention.

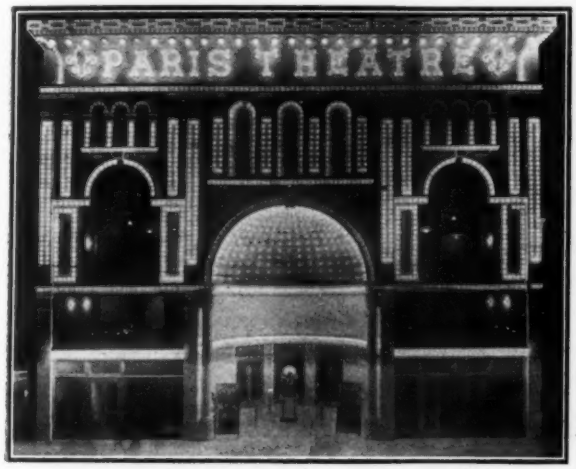
The places available for such a large gathering are limited and this action is the result of a statement of President Insull, of the Commonwealth Edison Company, who was represented at the meeting by Past-President Gilchrist, that it would afford the local company much pleasure to have the Association visit Chicago again.

# Commercial Practice
# Management, Rates, New Business

## THE COMMERCIAL VALUE OF ILLUMINATION.

### An Example in Denver's Theaters.

The decided development of the motion-picture business in Denver, Colo., has been accompanied by a tremendous increase in illumination, and the many amusement houses of this kind operating in that city have materially broadened the field of electrical application by the extensive use of current for exterior display illumination and for a variety of other purposes in the interior of the playhouses. Denver leads the world in the matter of first-run motion-picture houses—that is, those establishments vested with the privilege of giving the first exhibition of any of the various films, and in addition it probably has more brightly illuminated theaters of this kind than any other city in the country, regardless of size. There are now operating in Denver more than 30 moving-picture playhouses and all are extensive users of electricity for outside display—the high-candlepower tungsten lamps and the smaller-candlepower carbon lamps arranged in outline effects, for the most part, furnishing the light.




Illumination of Paris Theater, Denver.

Night View of Curtis Street, Denver.

Curtis Street, the best lighted thoroughfare in Denver, has over 150,000 candlepower distributed over a length of four blocks—from Fourteenth to Eighteenth Streets—and is Denver's "Great White Way." It is the most traveled street because of the lavish use of display lighting by the various proprietors of the seven moving-picture and vaudeville theaters. There is no disputing the fact that the light has really made the traffic on this thoroughfare and the truth of this is best explained by giving the opinions of some of the men having business interests on the street—the ones who are paying for the light and reaping any benefits that may be derived from this form of advertising.

According to Samuel Baxter, proprietor of the Isis Theater, one of the largest of the moving-picture playhouses, there were more people passing a place he owned on Seventeenth Street five years ago than were traveling Curtis Street at that time. This was before the advent of the illuminated theater in the Curtis Street territory. But since the introduction of the lighting the pedestrian travel outstrips the old location. When it is considered that this information is given out by a man who is paying for some of the illumination on the street it must be regarded as more than idle talk. When figures are taken into consideration there seems to be no doubt, as the records of these moving-picture houses show that about 100,000 people see their pictures every week.

The seven moving-picture and vaudeville houses now running on Curtis Street, between Sixteenth and Eighteenth Streets, use a total of 51,500 candlepower, more than one-third of the total of the street; 10,387 lamps, ranging in size from the four-candlepower carbon lamp upward to the 500-watt tungsten, are required to furnish this candlepower. The travel within this territory is greater by half than in the blocks from Fourteenth to Sixteenth Streets, where the lighting is not so intense, and the natural conclusion when the figures are considered is that the light is responsible for the great street traffic.

The history of the illumination of Curtis Street is rather interesting and dates back a little more than four years. At that time one of the enterprising theater managers of Denver opened the Cameraphone Theater and installed some very elaborate illuminating effects. This was when the moving-picture business was in its infancy in Denver, and although the illumination on the Cameraphone gave it tremendous advertising, the quality of the shows presented were not on a par with the illumination on the outside and it eventually became unprofitable to operate. Later it was taken over by Samuel Baxter and renamed the Isis. Under the new management the lighting was discontinued and the quality of the shows bettered, but without the pulling force of the light it did not do a paying business. In the course of time the illumination which had been displaced was again installed and later increased, until today the theater

has a total of 2,200 lamps and a candlepower of 8,500, and it is now one of the best payers of the several first-run houses.

The proprietor of this theater is a real live enthusiast on the pulling power of light. He claims it doesn't make any difference where a light is placed, it will pay for itself in advertising. This moving-picture man has now under course of construction a new theater, which, next to the Gas and Electric Building, will be the most brilliantly lighted structure in Denver, having a total of 37,000 candlepower on the exterior. In addition, he is interested in the entire electrical illumination of Curtis Street, being an active member of a committee of the street's merchants who are endeavoring to increase the lighting by the installation of artistic street poles from Sixteenth to Eighteenth Streets.

The new street lighting, the new Paris Theater with its 36,520 candlepower and the new Isis Theater with 36,000 candlepower, will give Denver's "Great White Way" 250,000 more candlepower than it now has.

The Paris Theater illumination is of beautiful design. The lamps are in a variety of colors, red, blue and purple, arranged to give a very pleasing effect. The lamps aggregating the 36,520 candles will be divided as follows: There will be 3,000 four-candlepower, 1,102 twenty-candlepower and 31 eighty-candlepower lamps.

The 4,000 lamps to be used on the new Isis will be divided as follows: 160 twenty-candlepower lamps, 134 thirty-candlepower, 42 fifty-candlepower, 41 eighty-candlepower, 17 125-candlepower and 19 200-candlepower lamps. These will be tungsten and in addition there will be 3,500 four-candlepower carbon lamps.

The design of this illumination will be entirely different from that on the Paris Theater. A sunburst of radial beveled plate shining behind a decorative group of statuary played upon by a search light will form the central lighting. The small lamps will be used in decorative effects, rosettes, and symmetrical designs which will blaze across the front of the building. Some of the larger lamps will be used to illuminate pedestals on the roof, while a number of others will hang between the pedestals, being suspended from chains.

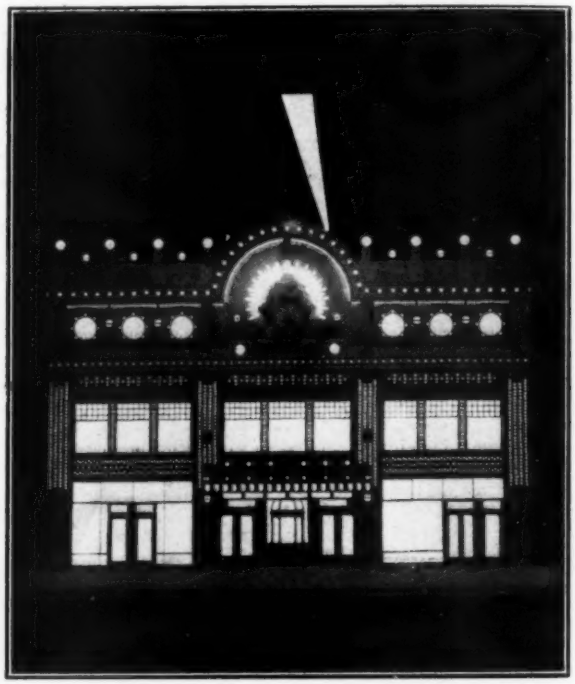
Besides the illumination, the theater will be electrically equipped throughout. A ventilation system capable of introducing and expelling air at the rate of 50,000 cubic feet per minute will be driven by electric motors, and the pipe organ in the establishment will be operated by a 15-horsepower motor. The moving-picture apparatus will throw a light a distance of 100 feet to the curtain and a small motor-generator set will be employed to prevent fluctuation of the light used on the moving-picture machine.

It is the belief of D. C. Weber, proprietor of the Iris Theater, one of the brilliantly lighted moving-picture houses, that the profuse illumination on the street has had a tendency to drive out the disreputable characters of all kinds, and the police records seem to bear out this assertion for fewer arrests are made on this thoroughfare than on any other in the city.

Besides the illuminated theaters there are a number of cafes which use a large volume of light and these houses are among the most active to increase the illumination of the street.

The number of lamps and the candlepower consumed by each of the theaters on Curtis Street, are as follows: Iris, 921 lamps, 9,000 candlepower; Isis, 2,200 lamps, 8,500 candlepower; Colonial, 2,500 lamps, 10,000 candlepower; Princess, 1,900 lamps, 7,600 candlepower; Empress, 2,000 lamps, 8,000 candlepower; Pantages, 900 lamps and four arc lamps, 6,000 candlepower.

Illumination of Princess Theater, Denver.



How New Isis Theater Will Be Illuminated.

## Co-operation in St. Louis.

The Union Electric Light and Power Company, of St. Louis, is co-operating with the progressive contractors and dealers of St. Louis in the sale of current-consuming devices with gratifying results. As an example of this co-operation there recently appeared an advertisement in the daily papers offering a special price on electric toasters, for one day only. The ad which was paid for by the Union company gave the names and addresses of seven dealers, in addition to its own offices, where the toasters could be purchased. Other appliances are being similarly advertised.

# Electrical Construction

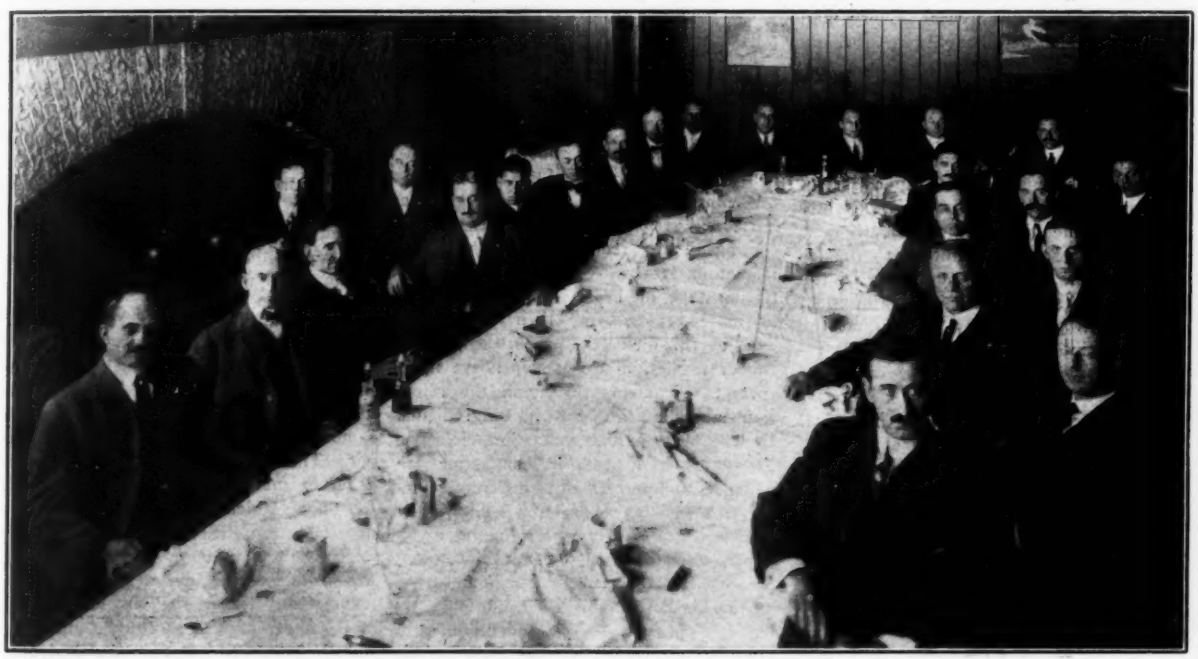
## CHICAGO CONTRACTORS MEET.

### Notable Rally of Electrical Men.

An event of unusual interest in Chicago electrical circles last week was the first of the banquets and rallies for this season which the Chicago Electrical Contractors' Association is in the habit of holding each month during the fall, winter and spring.

It would be repeating a fact familiar already to well informed electrical contractors all over the country to say that as hosts on an occasion like the meeting on Wednesday night, October 9, its members are unsurpassed. There were half a hundred guests, or so, and the program provided for their entertainment and instruction was remarkable for its completeness, both in arrangement and execution.

The photograph published herewith was taken at the business meeting of the Chicago Association and includes members of that organization only. Reading from the left-hand side of the picture around toward the right, the



Electrical Contractors' Association of Chicago.

that the Chicago Association has on its rolls some of the most prominent men in the contracting business. Any reader who has attended a meeting of the National Association within recent years, will recognize in the accompanying photograph men conspicuous among the leaders there. The Chicago Association's membership now includes the president of the National Association, a former first vice-president, and other men long prominent in matters meant to promote the welfare of contractors generally.

Another thing that must be said concerning the Chicago organization is men seated in the row next to the table are: W. H. Rattenbury, William McGuineas, J. N. Pierce, A. S. Schulman, L. H. Lamont, Harry Leasure, C. E. Doty, W. H. Brown, Ignatius Bond, Max Lehman, A. M. Wilmersdorf, R. W. Poelma, R. C. McMillan, C. A. Lundberg, Henry Newgard and C. H. Norwood. Second row, from the table, reading again from left to right: Charles R. Kreider, Judson McFell, J. Steinmetz, M. N. Blumenthal, F. J. Tank, B. L. Akins, and Ernest Freeman.

The Association held its business meeting Wednesday afternoon, and at 6 o'clock the members and their guests assembled in one of the large dining rooms of the Grand Pacific Hotel for the evening meeting. First came a substantial course dinner, at the conclusion of which William McGuineas, president of the Illinois Association of Electrical Contractors, who presided, introduced Victor H. Tousley, head of the department of electrical inspection of the city of Chicago, who was down on the schedule of exercises for the principal address of the evening.

By invitation, Mr. Tousley took for his theme the recent changes in the rules governing electrical construction in Chicago. The more important remarks of his are given elsewhere.

At the conclusion of Mr. Tousley's talk, Arthur P. Good, chief of the inspection department of the Commonwealth Edison Company, of Chicago, was introduced by Chairman McGuineas. Mr. Good spoke concerning the work of his department and emphasized especially the desire on the part of his company to co-operate in every practicable way with the electrical contractors of the city.

The final event of the evening was a

vaudeville show, in which the entertainment was furnished by a number of skilled players engaged especially for this meeting. If there was anybody present then who hadn't already forgotten, for the time being, the perplexities of the contracting business and the trials of the electrical inspector, the memory of such things as these must certainly have left him when this part of the exercises began. For an hour and a half players appeared and responded again and again to insistent demands for encores. This sort of thing was kept up, in fact, until Mr. McGuineas jokingly announced that, no arrangements having been made to pay for encores, he was afraid the Association might find itself embarrassed when it undertook to settle with the people furnishing the amusement.

When the entertainment was over, A. S. Schulman moved that the meeting tender an expression of appreciation to Messrs. Tousley and Good for their helpful addresses. Every man present responded heartily in a rising vote of thanks to these gentlemen.

There were a number of members of the Faraday Electrical Association on hand, and some of these took part in questioning Messrs. Tousley and Good in order to have certain especially interesting points of their talks elaborated. The aim of these meetings is to have present, in addition to the invited guests, all local members of the National Association. This aim must have been pretty fully realized at the meeting in question, for the total attendance was approximately one hundred.

The officers of the Chicago Electrical Contractors' Association are: Charles R. Kreider, president; Warren Orne, vice president; Frank Z. Sweet, treasurer; M. M. Blumenthal, secretary.

The committee which arranged the entertainment for the meeting mentioned above consists of J. N. Pierce, chairman; J. Cuthbert, and R. W. Poelma.

## Neutral Fuses.

The 1912 edition of the rules and regulations of the Department of Electricity of Chicago permits the installation of a solid neutral for service switches and branch mains for three-wire direct-current or three-wire single-phase systems.

The inspectors of the Commonwealth Edison Company have been instructed to see that in all cases the neutral be made solid on installations of this character. A letter containing this announcement was recently sent to all electrical contractors in the city by Arthur P. Good, the chief inspector for the Commonwealth Edison Company.

## UNDERGROUND CABLES[1].

By Charles R. Sturdevant.

The following study of underground cables has reference in particular to power cables. The special features most greatly desired in this class of cables are maximum carrying capacity with any permissible loss, long life and small maintenance cost. The different kinds of power cables now in common use will be considered from these standpoints.

Classified according to their construction, there are four kinds of insulated power cables,—rubber, paper, varnished cambric and graded or composite. Soft drawn copper of high conductivity, either solid or stranded, is used almost exclusively for conductor purposes in all of these cables. Aluminum for equal conductivity makes a larger and more costly cable, as it requires a larger amount of insulating material. The copper conductor wires are tinned before being insulated with any materials that would chemically affect copper.

Rubber insulation is composed of pure, clean, dry rubber, thoroughly compounded with definite quantities of mineral matter, and sometimes also with a high grade reclaimed rubber. The rubber compound is applied to the conductor either by means of a tubing or a horizontal strip machine in a dense even coating to any required thickness. The insulation is then covered with a protecting tape or braid, or tape and one or more braids, and then vulcanized. The useful dielectric properties of a rubber insulation are as dependent upon correct vulcanizing as upon the selection and mixture of its ingredients. It will be apparent that the dielectric properties of a rubber compound are dependent upon many different factors. These may be controlled only by men who are skilled in this line of work. When made of good materials and when properly treated, rubber compounds are unsurpassed for general insulating purposes. They will last indefinitely in pure or salt water, but they will be injured by acids or oils, or by extremes in temperature combined with alternate wet and dry conditions.

Paper cables are used extensively for general power-distribution purposes. In the construction of paper cables, narrow and very thin strips of manila paper are wound spirally about the conductor in sufficient number of layers for the required dielectric strength. The thickness of this paper varies from 5 to 10 mils, and the width usually from three-fourths of an inch up to 1.5 inches or more. Increasing the width tends to stiffen the cable. The material used should be the very best grade of manila-rope paper, uniform in texture, containing no particles of mineral substances, wood pulp, or low-grade materials, no pin holes and no trace of alkalies or residual chemicals. After the paper covering has been applied all traces of air and moisture are removed from the assembled core, which is then heated and thoroughly impregnated with hot insulating compound. The core is then passed through a hydraulic press and covered with a closely fitting lead sheath which permanently excludes all air and moisture and retains the insulating compound.

The ideal compound with which the paper is saturated will render the dielectric sufficiently high in both insulation resistance and in dielectric strength without making it so stiff that the cable will crack or break in bending even in fairly cold weather. Its melting temperature should be sufficiently low not to char or injure the paper during saturation, yet not low enough to be softened by normal working temperatures. In general, slightly increasing the fluidity of a paper insulating compound with insulating oils will improve its dielectric strength and increase the flexibility of the cable, but will reduce the insulation resistance, and vice versa. The importance of removing every trace of moisture from the cable cannot be overestimated. It is the last thousandth or millionth part that determines high insulating qualities when removed.

### Varnished-Cambric Cables.

Varnished-cambric cables are constructed in about the same manner as paper cables, the principal difference being in the use of varnished cotton or cambric tape instead of saturated paper. This tape varies in thickness with different makers, but is usually from 7 to 10 mils thick, and it varies in width depending on the diameter of the conductor. It is prepared by applying, under heat, several films of insulating varnish, which leaves the surface of the tape smooth and glossy, and renders its fibrous structure fairly non-absorbent. A special non-hardening compound is applied between the various layers of tape as it is wound about the conductor. This renders the completed dielectric high in insulation resistance and dielectric strength. It also renders the cable very flexible, prevents capillary absorption of moisture between the layers of tape, seals any possible skips in films and precludes air spaces. In general, this style of cable is a little more flexible than paper cables, and it is non-hygroscopic to such a degree that it is often used in dry places with only a saturated fibrous braided protection. Splices are easily made in this style of cable, and mineral oils do not affect the material, making it a valuable cable for

1. A paper presented at the annual convention of the Association of Iron and Steel Electrical Engineers; slightly abridged.

station work in connection with oil switches, transformers, etc. As regards cost, this cable occupies an intermediate position between rubber and paper.

**Graded or Composite Cables.**

The fall of potential through a homogeneous dielectric wrapped about a charged cylindrical conductor will not be uniform across equal section, but will be greatest near the conductor and least near the outer sheath. If the dielectric surrounding a wire be equally divided into several imaginary layers concentric with the conductor surface, a conduction current will flow from the conductor through the various layers to the outer sheath, and the total drop of potential through the dielectric (which equals that of conductor to ground) will in each layer be proportional to the resistance of that layer in ohms, which, varying inversely to its area according to ohm's law, will decrease towards the outer surface as the circumference increases. The outer layers, therefore, will not be working anywhere near their full dielectric capacity. On account of this phenomenon, very high stresses would require very great thickness of any uniform dielectric material, for the percentage increase of thickness would exceed that of the voltage increase.

This difficulty has been overcome in two ways. First by the construction of *graded* insulation in which the material in successive layers is given greater and greater specific inductive resistances, that layer with highest resistances being placed nearest the conductor. By this means the outer layer will be subjected to the same voltage stress as the inner, and there will be produced a uniform "potential gradient" throughout the whole thickness, resulting in a considerable reduction of dielectric thickness.

The same results can be accomplished by making *composite* insulation from different kinds of materials and placing the one having the highest specific resistance nearest the conductor. For example, one could use a certain thickness of varnished cambric over the conductor, then a certain amount of saturated paper over this; or first rubber, then varnished cambric. The successful manufacture of these special cables involves many constructional difficulties because in general each kind of dielectric requires a different treatment from the others,—one which, in fact, might be injurious to the others already placed. But if cable potentials increase as steadily during the next few years as they have in the recent past, we shall be compelled to build up the dielectric in some such manner as outlined, or to find some entirely new dielectric material having much better electrical properties than anything known at present.

Any of these various kinds of cables can be built for high or for low voltage service, in any required length within practical limits, and in diameters up to about four inches. Underground cables should always be provided with a lead sheathing to protect the insulating material from the destructive influences of deteriorating agencies. In general pure lead is used for this purpose. Where a stiffer sheathing is required, however, one, two or three per cent of tin is alloyed with the lead. The lead sheath varies in thickness from three-sixty-fourths of an inch for the smaller sizes of cables to nine-sixty-fourths of an inch or even greater for larger sizes. Quite frequently specifications call for a jute covering over the sheath, but the advantages of such a covering are sometimes questionable.

Power cables may have a single conductor, or they may have two, three, four or more conductors stranded about a common center, all interstices being filled with jute laterals so as to make the core compact and cylindrical in form. For some purposes two small conductors may be advantageously laid up parallel, and covered with sheathing. In multiple-conductor paper or varnished-cambric cables it is quite customary to divide the insulating material into two nearly equal thicknesses, one being placed about the individual conductors, the other being placed about the core of conductors in the form of a belt. This arrangement provides the full required insulation thickness between adjacent conductors, and between conductors and ground, and gives a much better distribution of material and a decreased outside diameter.

**Properties of Dielectrics.**

A dielectric may be defined as a non-conducting or insulating material through which an electromotive force establishes a molecular strain, or an electrostatic field of flux. The value of any cable dielectric material will depend upon six properties:

1. *Insulation resistance,* or the measure of its ability to prevent leakage of current through the insulation, in accordance with ohm's law. The insulation resistance of a dielectric applied to a conductor varies as its thickness, and inversely as its length. The resistance of most insulating substances varies considerably in different portions of the material and is slightly less when wrapped about a wire than when in the form of a plane sheet. If measurements are made by the galvanometer method a definite time of electrification, usually one minute, must be allowed; otherwise comparative results will be unreliable, owing to the long period required to fully charge large cables. In general, the insulation resistance of dielectrics will decrease greatly with increase of temperature, and this fact should be duly considered in making tests of cable installations.

The specifying of exceedingly high megohm resistances on larger cables generally requires a heavy and expensive cable and seldom benefits the customer to any extent. The ohmic resistance of a high-tension cable-insulating material is of secondary importance as compared with its dielectric strength.

2. *Dielectric strength,* or the measure of its ability to resist puncture by high voltage—its disruptive voltage intensity. Generally speaking, there is no direct relation between the insulation resistance and the dielectric strength of a material. As already explained, the electric stress is much greater near the inner surface of the wire where the curvature is greatest than in the outer layers where the curvature is least. The dielectric strength of any material arranged in the form of a plate is greater than when the same material is bent in the form of a hollow cylinder.

A high-tension voltage test on a small thickness of insulation material, or on a short piece of insulated wire, proves little or nothing about large quantities of the same material, because the dielectric strength varies in different portions of the material, and diminishes with increasing lengths, in all cable dielectrics.

The voltage required to puncture a given thickness of dielectric material will depend upon its dielectric strength, its configuration, the distribution of electric intensity or electric stress, its temperature, the time of application of voltage, and it is greatly lowered by the presence of moisture or air pockets. The resistance to instantaneous applications of potential stresses is in general much greater than to sustained applications. As the limit of dielectric strength of any cable material is approached, the temperature increases to a point where it chars, after which it soon breaks down. The dielectric strength decreases rapidly beyond a certain critical temperature, which is about 75 degrees centigrade for varnished cambric, and slightly higher for paper and rubber.

3. *Specific inductive capacity,* or the measure of power for transmitting electrostatic stresses and strains. This determines the strength of the charging current. This property does not require consideration in conductors carrying continuous current, but in many alternating-current circuits, such as telephone and underground cables, it is a factor which must be considered. In general, the capacity of rubber compound is considerably higher than that of impregnated paper or varnished cambric. It increases with decreasing thickness of insulation, with increasing temperature, and with increasing proximity to earth. The charging current in an alternating-current cable is a very real current flowing

continuously, and heating the copper as would a working current. It increases with voltage, with capacity of the circuit, and with frequency.

4. *Mechanical properties.*—The dielectric material must have sufficient strength to resist ordinary abrasion, and it must be quite elastic to allow of bending without cracking or breaking. Underground cables with lead sheaths should never be bent to a radius of less than eight times their diameter for rubber or cambric insulation, or ten times for paper. In very cold weather the latter should always be warmed before being bent at all.

5. *Permanence,*—or the measure of its useful life. It is comparatively easy to make a dielectric material that will give good results initially, but a difficult matter to make materials that will remain good for a long period of time. To meet this requirement the constituent parts of the material must be chemically balanced or inert, the material must be either non-hygroscopic or it must be rendered so by a sealed sheath. Its electrical properties should be sufficiently good to provide a wide margin of safety to withstand the continued electrical stresses brought upon it. Permanence of insulation requires good materials properly combined, and careful handling of the finished product.

6. *Thermal properties of insulation.*—The current-carrying capacity of any cable is limited only by its temperature elevation. There are three possible sources of heat in an underground cable, the greatest of which is the $I^2R$ loss in each conductor. This loss varies directly as the effective resistance of the conductor and as the square of the current. In a conductor of any given size and at any working temperature, the loss will be fixed for any load, and, hence, the heat loss for any load can be reduced only by increasing the size of conductor or by reducing the working temperature (and thereby the resistance) of the conductor.

The second source of heat in a single-conductor alternating-current cable is the eddy current $I^2R$ loss in the lead sheath, which may amount to a considerable amount under favorable conditions, as when the sheathings of two such cables are grounded or are allowed to come in contact with each other at frequent intervals. This eddy current increases with load current and with frequency. It is generally recognized as being poor practice to incase single alternating-current conductors in lead sheathing or armor whenever it is possible to avoid this construction, on account of poor regulation and increased energy losses.

The third source of heat is within the body of the insulating material itself and is known as the "dielectric hysteresis" loss. In direct-current cables and in low-voltage alternating-current cables this loss is of little consequence, but it manifests itself in high-potential cables, for the loss increases with the square of the working voltage, and is proportional to the frequency. It is a continuous loss and independent of load current.

The heat produced by the dissipation of energy in these several ways is accumulative, and it will raise the final temperature of the cable to a degree depending on several conditions, such as temperature and thermal conductivity of the surrounding medium, proximity, number and arrangement of other loaded cables or heated bodies, and the thermal conductivity of the insulating materials used in the construction of the cable. If the duct through which a cable extends be heated from any external source, then the maximum safe working temperature of the cable will be reached with a lower current value than could be used in a cool duct. Or in other words, the range of working current strengths decreases as the duct temperatures increase.

The immediate effects of high temperature cable working are, as already intimated, an increased copper loss, a reduced dielectric strength, a reduced insulation resistance, an increase in specific inductive capacity, and a possible injurious effect upon the dielectric itself. There are cases also where the sheath has been ruptured by gases produced in the interior of heated cables. Rubber insulation may suffer deterioration if operated continuously at about 60 degrees centigrade (140 degrees Fahrenheit) and paper and varnished cambric should not be worked above 75 or 80 degrees centigrade (167 to 176 degrees Fahrenheit). In high-tension cables, 15,000 volts and above, the working temperatures should be kept materially lower than the limits just mentioned.

### Cable Installation.

In a paper of this nature no attempt can be made to indicate all the details of cable laying, but rather to mention briefly a few of the more important features that should be observed.

Before drawing a cable into the duct, make sure that the ducts are thoroughly clean and free from any obstructions which are liable to injure the cable when drawing in. The utmost care should be taken not to bend the cable sharply, not to break through, cut, abrade, kink or dent the lead sheath, and above all not to allow the slightest trace of moisture to enter the ends of the cable after the seals have been broken. A failure to observe these points might lead to the ruination of the cable. The useful life of an underground cable is determined by the integrity of the lead sheath.

To economize in space, as many as six cables are at times drawn into one duct. This may be an advantage, but it also has its disadvantages, for the reason that if one cable should burn out there would be every possibility of burning up the remaining cables, and all six would be out of commission and would have to be replaced. But, nevertheless, the two wires of the same circuit should always be brought as near together as possible so as to reduce the passage of magnetic flux between them, whether this flux proceed from themselves or from other wires.

Any type of conduit for lead-incased cables should possess the following qualities. It should afford a thorough mechanical protection to the inclosed cable, securing it from accident during street excavations. It should be proof against fire, acid, gas, water and electrolysis, thus protecting the cable and maintaining it for a long period of time. The conduit should also have sufficient mechanical strength to resist the ordinary destructive influences to which street structures are exposed. The bore of the ducts should be smooth, straight and in perfect alignment.

A few years ago a three-inch diameter duct was considered sufficiently large, but for feeder cables called for to-day, which are often over three inches in diameter, nothing less than a 3.5-inch bore should be used, and if very long sections of cables are to be installed, the bore should be even larger.

Manholes, especially for high tension cables, should, whenever possible, be built spacious, be well drained, well ventilated, and they should be kept clean and dry. Their design should be such as to afford the best opportunity for bending the cable ends projecting from the ducts to a position on the wall where they are to be racked and jointed. Ample facilities should be provided in each manhole, either by shelves or adjustable racks for supporting the cables in place. The cables should be so arranged in the manhole as to permit of making the joint on the longest length of straight cable obtainable. A good ground of ample capacity should be provided in each manhole for the purpose of bonding cables, whenever necessary, to protect the cable from stray currents.

It is generally admitted that the greater part of trouble which occurs on underground cables is due to poorly made joints, or to the presence of moisture or cracks in the insulation near the joints. With good material and careful and competent workmen, the insulation of the joints can be made as reliable and as durable as that on any other part of the cable. The construction of a joint is, therefore, of prime consideration, and the purchaser should have at his command experienced and thoroughly reliable cable workmen.

In the making of a perfect joint, jointing sleeves of pure copper of suitable length, tinned and well finished, should be used. These sleeves should be provided with an opening along their entire

length so as to permit of the solder flowing freely throughout the joint when made, thus insuring a good soldered union. They should be ample in capacity.

High-grade insulating materials should be carefully chosen to suit the special conditions.

The work should be done by reliable and experienced cable men under the supervision of an expert who critically inspects all work.

Every trace of moisture should be excluded from the joint and adjacent parts of the cable. This is most essential.

The cable should never be bent to a radius of less than eight times its diameter for rubber or cambric insulation, or ten diameters for paper insulation. The latter should, in extreme cold weather, be warmed before being bent at all.

The joints in a multiple-conductor cable should not be staggered as often called for in specifications, for this would necessitate making the joint longer than is practical, or if made on a short joint, it would necessitate dangerously bending the conductors to permit of applying the insulation.

The layers of insulating tape should be drawn tight to exclude air and they should overlap each other.

The lead sleeve should be properly proportioned, well wiped on and entirely filled with compound previously heated to the correct temperature. The finished cap must be water tight.

The length of a joint should be in proportion to the size of the conductor, avoiding short joints where it is possible. The insulation on a joint should be at least 20 per cent thicker than that on the cable itself. Before drawing the lead sleeve over the newly made joint, the new insulation should be well dried out to remove all trace of moisture taken up from the hands of the workmen or elsewhere.

## Interesting Notes on City Rules.

Our issue of August 3 contained abstracts from the municipal rules concerning electrical construction in Chicago, the 1912 edition of the city electrical code having then just been issued. Since that time, the Department of Electricity of the city has distributed among contractors and others concerned copies of a pamphlet in which the changes incorporated in the new rules are summarized. These changes were the text of an address by V. H. Tousley, chief electrical inspector for the city, at a banquet given by the Chicago electrical contractors on October 9, and reported elsewhere in these columns. Contractors and inspectors in other localities will find Mr. Tousley's remarks on this occasion, as they are given in substance in the following notes, of interest and value.

The first change to which Mr. Tousley called attention was that concerning meter fittings. It is intended to require a suitable terminal fitting on all meter loops in locations where meters are liable to be changed. The object of this is to provide a finished job at meters and to avoid live ends of wires being left when a meter is removed. The enforcement of this rule is temporarily held in abeyance, since only one manufacturer has undertaken to make a fitting of the desired type. As soon as there is an ample supply of these meter fittings on the market, the rule will become effective.

It was pointed out that the city rules now require that the base frames of generators of 550 volts pressure or less be insulated from the ground, wherever this is practicable. The old rules made insulation optional.

The use of soft-rubber bushings to protect the leads coming through the frames of generators is now permitted, except where there are substances present which would attack the rubber.

Generator leads exposed to moisture must consist of lead-covered wires.

It was explained that for the protection of instruments and pilot lights on switchboards, standard National Electrical Code fuses are preferable, but that the new rules permit the use of standard inclosed fuses of other designs, if of *not over two amperes capacity*, for this purpose.

The rule requiring 18 inches of space between the back of a switchboard and the wall, means that there must be 18 inches between all busbars, rheostats, and the like, and the wall. It must be *clear* space.

Asbestos used on the back of a switchboard must be asbestos board. The use of sheet asbestos is no longer permitted.

Dustproof face plates are now required on motor rheostats in dusty places.

Motors operating at a potential of 550 volts or less must be thoroughly insulated from the ground wherever this is feasible.

Mr. Tousley explained that all conduit work exposed to the weather must be waterproof. Where there is such exposure, ordinary conduit wiring, with locknuts and bushings, will not be approved. The outlet boxes and fittings used must have threaded connections for the conduit, and the covers of boxes must fit down on gaskets. This rule is directed especially to such work as outline lighting.

Service wires may be run over roofs of buildings if they are kept seven feet from flat roofs and one foot from pitched roofs and the wires not attached to the roof.

Service conduits must not be run on the inside of the building. That is, the conduit must be carried on the outside of the wall to a point as near the cut-out cabinet as is practicable, and be run through the wall here. The conduit may be embedded in the masonry of a wall, however.

When transformers are placed in vaults outside of buildings the vault must be of fire-proof construction and must be properly drained and ventilated. A fire-proof door or cover must be provided, the same to be so arranged that access to the vault cannot be easily obtained by unauthorized persons. When the vault door opens into a building, a non-combustible ledge at least six inches high must be provided at door opening.

The transformers and all other electrical apparatus located in underground vaults outside of buildings must be of water-proof construction and the cases of all apparatus and the metal sheaths of all cables must be permanently and effectively grounded.

Vaults must be so constructed and the apparatus within the same so arranged that access may be readily obtained by workmen, and in no case must it be necessary to come in closer proximity than ten inches to any current-carrying wires or apparatus in entering the vault.

Circuit-breakers which take the place of fuses must have a trip coil in each wire of the circuit to be protected.

Solid neutrals are allowed in three-wire systems.

With 550 volts pressure or less, on branch lighting circuits, 12 amperes is allowed; in sign and outline wiring 25 amperes is permitted.

For the protection of a motor whose maximum capacity is greater than that for which inclosed fuses are approved, a circuit-breaker must always be employed.

Except in the case of the service switch, the fuses are not required to protect the switch; but if the fuse does not protect it, the blades should be "dead" when the switch is open.

Open wires at motors, meters and similar devices must be protected with flexible tubing if they are liable to come in contact with any conducting material, it was explained.

Mr. Tousley called attention especially to the fact that the use of wooden plugs for fastening circuits to brick or concrete walls is not now allowed. Expansion bolts or toggles must be used. He also pointed out that a wood block backing is required when knobs or cleats are installed on plaster walls.

Other changes in the Chicago rules to which Mr. Tousley called special attention were the fact that a pipe driven into the ground may not be used for grounding armored cables or conduits. A copper plate must be used instead; and that the use of chain fixtures in show windows is not approved.

# National Association of Electrical Inspectors.

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### Secretary's Message.

The three questions in this issue, together with the two which will appear next in sequence, came to us from a construction company in a state whose "anti-trust" statutes prevent the combined insurance organization from doing inspection and other work there, and where, moreover, municipal inspection is as scarce as the great auk. Members were therefore asked to respond in more detail if possible than usual.

There is little to say regarding the questions except as to No. 203. I imagine the size of feeder is rarely, in moderate-size installations, anything other than a matter of the wireman's judgment. He has on hand a few sizes and uses that which he guesses will do, except in really big jobs and where the maximum allowed drop is stated in the specifications. Equal circular millage is hardly ever necessary, and even ampere capacity equal to maximum possible amperage of the sum of the branches may entail, in large jobs, unnecessary cost. In such cases the contractor ought to consider carefully the diversity-factor of buildings of similar type, use and locality, and indeed, this is one of the places where sound, trained judgment and experience may on close figuring turn loss into profit.

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### Support of Outlet Boxes.

**Question 201. In buildings of wooden construction wired in rigid conduit, is the support of outlet, junction and similar boxes by the conduit sufficient, provided there are always two pipes at least entering the box, a short flying piece being used at dead ends, or must some special support be used?**

Answer 1 (E). A portion of section *b*, Rule 28, reads, "and the entire system must be mechanically secured in position." This would indicate a support for the outlet box other than the conduit itself. If nothing but the conduit, secured by locknut and outlet bushing, supported or held the outlet box in place, there would be an inadequate support for the fixture, which would later be installed. "Mechanically secure" requires a block or other form of support.

**The matter appearing in this section consists of questions on the National Electrical Code, its interpretation and meaning, and questions as to whether certain methods of wiring are in accord therewith. These questions are gladly received from anyone interested, even if not a member; they should be sent to the secretary with any needed elucidating sketch. They are answered by each member of the Executive Committee according to his knowledge of what the ruling would be in his jurisdiction.**

**It should be understood that no pretense is made to give an authoritative interpretation of the Code. This is a voluntary association; it has representation on the Electrical Committee of the National Fire Protection Association, which prepares the Code, but it has no right, and claims no right, to give a final interpretation of anything in the Code. It is only intended to give the interpretation which seems correct to the members of the Executive Committee. No attempt is made to edit or correlate the answers from the different members of the Committee, as it is felt that the occasional difference of opinion is calculated to lead to a further study of the matter in question, further discussion and the final clearing up of obscure points.**

**The aim is to help toward a better understanding of the Code on the part of all; a more uniform conception of its meaning; increased precision in applying it; and harmonious action of those using it, for the common good.**

Answer 2 (B). Rule 28, referring to interior conduits, says, in section *b*, "Must be continuous from outlet to outlet or to junction boxes; and the conduit must properly enter same and be secured to all fittings, and the entire system must be mechanically secured in position." In this city we feel that to conform to the last portion of this section it is not only advisable but necessary in many if not the majority of cases arising, to install suitable backings to fasten boxes on before the system can be considered as "mechanically secured in position," and to save any possible confusion due to differences in judgment on the part of the contractors and inspection department as to when such backings are necessary, we call for them in all cases in buildings of wooden construction.

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Answer 3 (P). The code does not specify in detail whether wooden blocks or similar backings are required for conduit boxes. It does say, however,—Rule 28*b*—that conduit fittings "must be mechanically secured in position." Whether or not this result is attained must be left somewhat to the judgment of the inspector, as there are a number of ways of fastening—by bridging, by setting in cement or plaster of Paris, or by screwing fast, with two screws, to a floor beam or stud—which may be perfectly satisfactory. Generally speaking, dependence on the conduit itself does not insure a satisfactory job.

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Answer 4 (O). Outlet boxes should be firmly supported as required by Rule 28*b*, which calls for the entire conduit system to be mechanically secured in place. Rule 59*g*, governing the construction of outlet and junction boxes, clearly indicates that the support must be in addition to that afforded by the conduits, except in the case of exposed conduit fittings threaded to the pipes.

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Answer 5 (F). Outlet and switch boxes should be supported independently of the conduit system. See Rule 59*g*, National Electrical Code.

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Answer 6 (N). We should say that unquestionably there should be a wooden support placed firmly between studs or floor joists for each box. The only exception would be where the conduit was firmly threaded to the fitting as sometimes occurs. Where the grip is by checknut and bushing it is clearly insufficient. We call for them in all cases unless permission be given in writing for some clearly satisfactory construction difficulty.

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Answer 7 (L). Yes; wooden blocks or similar supports should be used to secured rigidity of conduit boxes, except on exposed-conduit systems when threaded boxes into which the conduit can be screwed may be used. (See Rule 59*g*.)

Answer 8 (K). Cases arise in practice in which the piping to an outlet box has to be depended upon entirely to support the box. This happens when there are so many conduits leading to the outlet as to leave no room for the customary supporting timber. Whenever there is room, however, it is our practice to require the box to be secured to a two by four-inch timber or other suitable support.

### Shallow Outlet Boxes.

**Question 202. Is any distinction made between outlet boxes of shallow and deep types—as, for instance—between a type of box, A, which is four inches in diameter by two and a quarter inches deep; a type, B, four inches in diameter by one and five-eighths inches deep, and still another type, C, four inches in diameter and half an inch deep? Or is the matter left to the wireman's judgment? The shallower boxes often do not give proper space for stowing the splices.**

Answer 1 (F). In this jurisdiction the shallow outlet boxes are mostly used on concealed-conduit construction in fireproof buildings, the splices being covered by the fixture canopies. With fixtures and shallow boxes properly installed, we can see no reason why they should not be used for concealed conduit construction, irrespective of the building construction.

Answer 2 (C). Rule 28*d* requires an "approved outlet box or plate at each outlet," except "At exposed ends of conduit (but not at fixture outlets) where wires pass from the conduit system without splice, joint or tap, an approved fitting having separate, bushed holes for each conductor is considered the equivalent of a box." "Outlet plates must not be used where it is practicable to install outlet boxes."

An approved outlet box should, in our judgment, be of such depth as will provide proper space, and the use of "approved boxes" should, of course, be insisted on in all practicable cases.

Answer 3 (E). A distinction, as suggested in the question, is sometimes made, or permitted, in old buildings or where there is not room, or depth, enough for the installation of the regular box. The shallow boxes or plates must not be used where it is practicable to install outlet boxes. This requirement will be found in Rule 28*d*.

Answer 4 (P). The code makes no distinction as to location between shallow and deep outlet boxes, and we are therefore obliged to accept as shallow a box as will provide ample space for the splices it is required to accommodate. In this territory we feel that it would be well if the outlet box rule was amplified to cover this point.

Answer 5 (O). Rule 28*d* prohibits the use of outlet plates where it is practicable to install boxes. The very shallow types of boxes, that is, those not over half an inch in depth, should be considered as outlet plates and should be advised against, unless there is some good reason for their use. Except as outlined above, the selection of the type of box to be used at any outlet should be left to the judgment of the wireman. I do not believe that it is always customary or desirable to have the splices at fixture outlets stored away within the box where the boxes are properly covered by the fixture canopies; because the fixture wire, which has comparatively thin insulation, is very apt to be in contact with the grounded metal of the outlet box, and experience shows that it is often impossible under these conditions to secure the required insulation resistance on the system. If the boxes are not covered by fixture canopies, then approved outlet-box covers are necessary to complete the conduit system, and in such cases the shallow boxes would not be desirable, owing to the the small space for the splices and the difficulty of installing covers.

Answer 6 (L). Yes; according to Rule 27*b* and *d*. The device referred to in this question is not an outlet box, but an outlet plate, and it must not be used where it is practicable to use an outlet box. The type *B* shallow box is four inches in diameter by one and five-eighths inches deep. The box referred to as type *A* is of the same diameter and is two and a quarter inches deep. Either of these would be insisted on instead of the plate called type *C* in the question.

If conditions were such that the installation of either *A* or *B* was not practicable, then the use of the outlet plate would be permitted and extraordinary precautions insisted upon for the protection of the splices.

Answer 7 (N). Yes; in this jurisdiction the type *C*, which is really a plate, is allowed only as a surface support in place of the old "crow foot," or where, structurally, nothing better can be placed. The type *B* is allowed in frame buildings where the architect has set the studding the narrow way, say two inches by four inches, to give two inches between laths, as on either side of a sliding door, for instance, and in similar places of like thinness in other types of building. Everywhere else the deep box, type *A*, is required.

Answer 8 (K). It is the practice in this jurisdiction to require outlet boxes of the deeper type if the location of the outlet permits the use of a box of this sort. It frequently happens, however, that only a shallow box, or even an outlet plate can be used. This, it seems to us, is a case which has to be left to the discretion of the Inspection Department having jurisdiction. See Rule 28*d*.

### Capacity of Mains.

**Question 203. In the case of mains feeding into a cabinet from which are taken several branch circuits each rated at 660 watts but some of which may be of No. 12 or No. 10 wire, must the mains be of a cross-section, in circular mils, equal to the sum of the branch circuits? Or is a carrying capacity equal to the total of the branch circuits, counting each 660 watts at the proper voltage, sufficient?**

Answer 1 (P). We require that mains feeding cabinets carrying branch circuits should be of a capacity sufficient to care for 660 watts times the number of circuits, unless it can be shown that the actual connected load will at all times be smaller than the total arrived at by the above calculation.

Answer 2 (E). The mains should always be of sufficient size to care for the maximum amount of current that will be used in the installation.

Answer 3 (F). In this jurisdiction mains feeding a branch lighting circuit tablet board would be approved if figured on the 660 watts to the branch circuit basis; provided, that there were no branch circuits connected to the board on which 1,320 watts could be connected under the rules of the National Electrical Code.

Answer 4 (B). Mains feeding into cabinets containing branch lighting circuits of 660 watts each should not be required to be of carrying capacity equal to the combined circular millage of all the branch circuits, some of which may be No. 10 or No. 12. Mains of capacity equal to the possible demand of the load to be connected to same are satisfactory from an inspection standpoint.

Answer 5 (O). The matter of the size of mains and feeders is more of an engineering problem than one from inspector's standpoint. These sizes are usually determined by the allowable drop in voltage under full load. It would seem to be the inspector's duty to recommend copper sufficient to

carry 660 watts for each branch circuit, or, at least, sufficient to carry the connected load. The inspector could not, however, enforce such a recommendation, and under the Code must approve feeders of any size—No. 14 or larger, if protected by fuses in accordance with Rule 23*e*.

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Answer 6 (N). This is purely an engineering problem. The inspector cannot, under the Code, do otherwise than to accept the size mains installed if they are properly fused, under Rule 23*e*. Our feeling would be, however, that the second alternative would come pretty close to being safe in the average case. If the fusing is correct, the only result of too small mains (neglecting blowing of fuses) will be excessive voltage drop and consequent poor regulation at the lamps.

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Answer 7 (L). Yes. The mains should be of equal carrying capacity to the combined circular millage of all the branch circuits. The question is not definite. There are three factors for a contractor or engineer to consider in arranging an installation, viz.: safety, efficiency and cost, none of which would be bettered by increasing the branch wiring in size over that required by the Code.

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Answer 8 (K). Rule 18 of the National Code specifies the allowable carrying capacities of wires, and so far as the Code is concerned we cannot see that the inspector has any authority for permitting departures from the equirements of this table. With exceptions which are very rare, the inspector can never be sure that all the branch circuits from a given main or feeder will not at some time or other be fully loaded simultaneously. Hence it appears to be the best practice to insist upon the mains or feeders being sufficiently large to accommodate such a load without exceeding the allowable carrying capacity. It is true that Rule 23*e* provides for the protection of such mains and feeders, but there is generally the danger from overfusing by irresponsible parties after the work has been passed upon by the inspector.

# Public Service Commissions

### WISCONSIN.

Judge Stevens of the Circuit Court last week sustained the demurrer of the Railroad Commission to the complaint of the Milwaukee Electric Railway and Light Company. The company maintained that the Commission had no authority to order the sale of thirteen car tickets for 50 cents in its recent decision, as an ordinance, passed by the Milwaukee Common Council in 1910, conferred upon the company the right to collect a five-cent cash fare during the life of the franchise. The opinion states "that the provision under consideration is a limitation upon the rate of fare that may be charged and not a contract giving the plaintiff the right to charge a five-cent cash fare. It follows that the order of the Railroad Commission does not impair the obligation of any contract and that the complaint does not state a cause of action." It is expected that the Milwaukee Railway Company will carry the case to the Supreme Court.

The Commission has ordered the Pulaski Merchants' and Farmers' Telephone Company to restore telephone service to one of its subscribers who has been refused service since February on the grounds of a violated contract. The company has refused to give service notwithstanding its failure to secure its instrument through replevin proceedings. It appeared that the petitioner in this case had violated certain rules and regulations governing the use of farmers' lines, but that he had promised to observe all regulations carefully in the future. The Commission was of the opinion that one offense in itself could not be a sufficient excuse to deny telephone service to any subscriber, unless it was clearly evident that the promises of reformation were not made in good faith.

The Commission has refused the application of the Platteville, Rewey and Ellenbury Telephone Company for authority to put into immediate effect the increased sale of rates as ordered by the Commission in a decision of a year ago. According to the terms of this decision, the petitioner was empowered to increase its schedule of rates upon the completion of a full-metallic telephone system. The Commission was not willing that the increased rates should go into effect for each subscriber separately as soon as each circuit was made full-metallic, as desired by the petitioner, but permitted the utility to place in effect the rates authorized for city patrons at such time as all the city lines have been made metallic. The company's large system of rural lines will be changed over as soon as possible and the new rates for rural service will go into effect upon the completion of the work. The petitioner also applied for authority to charge a 25-cent penalty for lax payment of bills. The Commission, while recognizing the necessity of a penalty provision, was of the opinion that a 15-cent charge had proven sufficient in other cases and should be ample in this. The Commission pointed out that the practice of furnishing service for two phones at the rental price of one was contrary to the public utility law and must be stopped at once. This practice began at the time when the company first began to furnish service in competition with an existing utility.

### OHIO.

The Public Service Commission has authorized the W. H. Burton Company, of Cleveland, to issue capital stock of the par value of $1,000, to be sold for not less than par. The proceeds are to be used for the construction of extensions and improvements of the company's plant.

The Arcade Service Company, of Cleveland, has been authorized to issue $1,000 of capital stock, the proceeds to be used to purchase from the Cleveland Arcade Company its outside distribution system.

### MASSACHUSETTS.

The Massachusetts Railroad Commission has approved an issue of 3,300 shares of capital stock, of a par value of $100, by the Berkshire Street Railway Company. The proceeds are to pay the cost of the state-line extension.

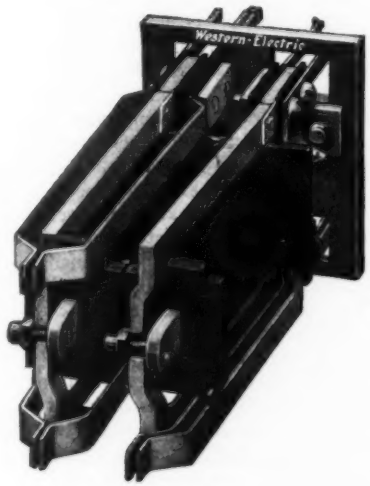
### OKLAHOMA.

The Corporation Commission has deferred final action on the complaint of F. E. Clayton of Chickasha against the Pioneer Telephone Company, alleging discrimination in rates, in view of the discovery that the discrimination complained of grew out of the application of zone rates. The whole question involved in the use of the zone system is to be threshed out by the Commission at a later date.

# New Electrical and Mechanical Appliances

## A New Telephone Relay.

The constant quest for new and better ways to do the old things has brought about the development of a new telephone relay, by the engineers of the Western Electric Company. The new relay, which is of the type known as the "line and cutoff" relays and is designed primarily for switchboard equipments, has been designated with the code number 194. The aim underlying the development work was to produce a relay which could be sold at a lower figure and still be better than the line and cutoff relay known in telephone circles the country over under the code number 163. This aim has been attained.




Telephone Relay.

The No. 194 relay is made entirely of punchings. Numerous installations have already shown that, from an operating standpoint, the new relay possesses many advantages, principally that of being easier to adjust over lines of varied length. The maximum line resistance over which it can be adjusted to operate satisfactorily is greater than that over which most other relays will work. As it will meet the adjustments of the No. 163 type, it may be used in old equipments where the new and old must aline with each other, although originally designed for new installations.

The new relay possesses many features which stamp it as the superior of the old one. There are no knife-edge armatures, the contacts are more accessible, the number of parts is smaller, it occupies less space and can be mounted in a narrower space, all iron parts are electrogalvanized and the line part is of the same mechanical design as the cutoff part of the relay. The windings are of black enameled wire. Atmospheric conditions, such as high temperature and excessive humidity, have practically no effect on its operation. The new relay is light and little liable to jar out of shape and adjustment. The springs and terminals are well separated, making adjustment and inspection simple and expeditious.

## Powell Process of Wood-Preserving.

The object of this process is for rapidly seasoning, preserving and improving timber, and rendering it secure against dry-rot and against the attacks of white ants. Some ten years ago the inventor of the process thought that, as sugar was crystallized sap and therefore an amorphous form of wood, the filling of the interstices of the wood with saccharine solutions might prevent dry-rot. Following this, experiments showed that wood could be rapidly seasoned without deterioration by the aid of sugar and its by-products, the solutions rapidly penetrating the wood without the aid of vacuum or pressure. In 1904 a syndicate was formed for carrying out experiments on a commercial scale, works being erected at Stratford, England. Since that time the experiments have continued; all kinds of timber, including those of India and Australia, have been subjected to treatment. "Powellising" wood is also making headway in New Zealand.

The process consists in treating wood in a saccharine solution; it is simple and inexpensive. The solutions vary in composition, and certain other substances are added to suit the special purposes to which different woods are put. When the wood has been dried it is ready for use.

The plant required consists of open tanks heated by steam pipes, drying chambers, storage tanks for holding liquors, etc. No pressure is applied at any stage of the process, nor is the wood subjected to vacuum at any time, the timber being merely immersed in the tanks and the solution gradually raised to definite temperatures according to the size and nature of the wood. The whole process, including drying, occupies generally a few days, but in the case of very large timber it may extend to three or four weeks. It is claimed that the cost of the process is lower than that of any other method. It is now being exploited by the Powell Wood Process Syndicate, Limited, 718 Salisbury House, London, E. C., England.

## Artistic Nelite Portables.

It is not often that a really novel portable lamp is offered, but indications are that the Veluria lamp here pictured comes under that head. This portable is made of Veluria glass and

Veluria Glass Portable.

has a small lamp wired in series in the base so that the entire unit glows when the lamp is in service.

The photographic reproduction fails utterly to show the beauty of this Veluria unit. It is a pure white alabaster when cold, but when lighted the glass takes on a faint blush or "fire" that is extremely pleasing and altogether unusual. The decorations on the base and shade are deeply etched and give the lamp a unique character and richness.

This example is but one of the many new portables being offered by the Nelite Works of General Electric Company, Cleveland, Ohio, for this year's holiday trade. The complete line embraces lamps of Veluria and Iris glass.

### Phototelegraphy.

The electric transmission of photographs with the apparatus of Dr. Korn has been put in commercial operation in France, and the Paris newspapers are making regular use of this service. Events occurring in the South of France in the afternoon are depicted with illustrations in the newspapers of the following morning.

The former apparatus of Dr. Korn, making use of selenium, operated with satisfaction upon a short line, but this method was not found applicable on long lines, due to the fact that a very small current was necessary and disturbances on the line interfered too greatly with the transmission.

The method now in use dispenses with the need for selenium. A copper sheet resembling a half-tone plate is prepared from the original negative. It consists of parallel lines in gelatine upon the copper surface, these lines being of a width which depends upon the depth of tone in the picture. The copper sheet is bent around a metal cylinder, against which a metal point bears. As the cylinder rotates, the lines of gelatine break the contact between the point and the cylinder for a greater or less time, and this interrupted current is used for transmission.

In the receiving apparatus a photographic film is wrapped upon a cylinder rotating in a dark box, in which there is a small aperture to admit a beam of light. In the path of the beam is a shutter which is controlled by the line current. The transmitter and receiver must be operated in synchronism and this is done by means of a synchronizing impulse, which is sent over the line once for each revolution. With this method a much larger current can be used and the line disturbances have proportionally a less effect.

### The Central-Battery Telephone in Spain.

The need for the very best kind of telephone service is making itself felt in Spain as it is in other countries. The second central or common-battery switchboard is shortly to be installed in the northern part of the Iberian peninsula at Pamplona.

The first central-battery installation in Spain was made about four years ago in the seacoast city of San Sebastian, separated from Pamplona by the Cantabrian mountain range. This equipment was manufactured and installed by the Bell Telephone Manufacturing Company, of Antwerp, which is the Belgian concessionaire of the Western Electric Company, of the United States. It consists of an eleven-section multiple switchboard of the relay central-battery type with a capacity for 2,000 lines. The initial equipment was for 650 lines and required 18 operators.

The equipment to be installed at Pamplona is also to be furnished by the Bell Telephone Manufacturing Company, of Antwerp, and consists of a number of sections of what is known as the No. 10 central-battery switchboard. This is a lamp-signal relay board employing a cutoff jack in place of the cutoff relay ordinarily used.

### Appleton Outlet Box for Concrete Buildings.

The construction of reinforced-concrete buildings is becoming more general since the advantages of this type of structure have become better known. In wiring such a structure special problems are frequently met. These have been investigated by the Appleton Electric Company, 22 North Jefferson Street, Chicago, and as a result of its study a new Appleton outlet box has been placed on the market.

As shown in the illustration herewith, this box is of octagonal form, 4 by 4 inches across and 3.5 inches deep. This extra depth eliminates the need for an extension ring. By the old method, the cement would run between the box and the ring and thereby cause the box to fill up with cement. The knockouts are from two and one-quarter inches to two and one-half inches from the edge of the box, which gives ample room for reinforcements and eliminates the necessity for bending the conduit. By using this box, the contractor saves a lot of time and money.

Appleton Outlet Box.

### Water-Softening by the Aid of Aluminium.

The water-softening process of Herr Brandes, a chemist of Hanover, has been tested in the Vienna experimental station for steam and heat technics by the Vienna Association for the Examination and Insurance of Boilers. In this process the feed water is passed over a corrugated aluminium plate while exposed to the action of light. The experiments were made with a Meunier boiler of 2,440 square feet heating surface and 10 atmospheres pressure. Three experimental runs, each lasting 200 hours, were conducted. In the first experiment the water was passed through an aluminium trough while being illuminated; in the second series the trough was kept covered while the feed water passed through it; in the third series the feed water was not treated in any way. The amount of scale deposited per kilogram of feed water was 0.011 gram in the first case, 0.025 gram in the second, and 0.051 gram in the third case. It thus appears that the simple influence of light is about as important as that of aluminium. The lengths of time required for removing all the boiler scale after the three tests were in about the same proportion—namely, 40, 108, and 186 hours.

### The Largest Direct-Current Generators.

Seven vertical water-wheel type electric generators, which represent units of the largest capacity ever built for generating direct current, will be installed in the new plant of the Southern Aluminum Company, at Whitney, N. C., that was recently referred to in these columns. Each machine will have a rating of 5,000 kilowatts, delivering 20,000 amperes at 250 volts and operating at a speed of 170 revolutions per minute. Two smaller direct-current generators of the same type, rated 2,500 kilowatts at 300 revolutions per minute; two 1,250-kilowatt alternators, having a speed of 514 revolutions per minute, with two 16-kilowatt exciters, and all necessary switchboards and controlling devices are also included in the installation.

The contract for all the electrical apparatus has been placed with the General Electric Company, and the installation will be one of the largest and most modern of its kind in the world. It is the intention of the Southern Aluminum Company to push to completion the project now under way and to have in operation in the course of the next eight months a manufacturing plant that will turn out some 25,000 tons of aluminum annually.

The company was recently incorporated under the laws of the State of New York with a capitalization of $8,000,000 and was organized by some of the largest aluminum manufacturing companies of Europe. The enterprise has been financed in France and is closely associated with L'Aluminum Francais, of Paris. The work at Whitney is in charge of R. Heroult, an eminent French engineer, who is recognized as one of the most expert authorities in the world on the manufacture of aluminum. Although Dr. Heroult has been directing constructive operations there but a few weeks, remarkable progress has been made, and it is

confidently expected that the entire plant will be in readiness for turning out the product of the company by the middle of 1914.

The plant throughout will rank among the greatest and most perfectly equipped for the manufacture of aluminum in the United States. Only one other in the country, at Niagara Falls, can compare with it. In the complement of buildings are nine furnace rooms, wherein the alumina will undergo the various processes incidental to conversion into aluminum. Each of these structures measures 60 by 500 feet, and one electrode factory of similar dimensions is also included in the group.

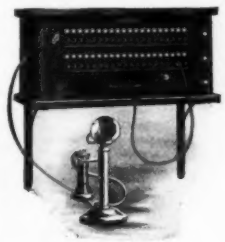
Aluminum, because of its lightness and toughness, finds almost universal application nowdays. Wire and cable made of this product are rapidly coming into extensive use for the transmission of high-tension electric power. A certain type of clay termed bauxite, which is found in Georgia and the Middle West, enters into the manufacture of the commodity. From bauxite alumina is made, and through intricate electrolytic methods this is then transformed into the metal aluminum. The production of aluminum from alumina is the only process that will be carried on at the Whitney plant.

The immense machines, which will supply the electric current for the several operations of this vast industry, will be installed immediately over wheel pits and direct-connected to the vertical shafts of S. Morgan Smith turbines by forged-steel flanged couplings. Each 5,000-kilowatt generator will weigh in the neighborhood of 150 tons, measure 22 feet in diameter and extend 13 feet above the floor level. The entire rotating element of the generators will be supported from an overhead thrust bearing. While the normal speed will be 170 revolutions per minute, the machines will be designed with provision for a safety runaway speed of 75 per cent above normal. Simplicity will characterize the switchboards and controlling devices and these will consist of types entailing an effective minimum number of parts. The wheel governors will be provided with remote electric control for both hand and automatic operation.

The establishment of the Southern Aluminum Company's plant at Whitney is transforming the site into a bustling city. While the construction of the plant is underway it is anticipated that 2,000 people will reside there and 500 new concrete houses are being erected to accommodate the influx of population. Experienced chemists, electrical and hydraulic engineers and experts in every branch of the business will constitute the corps of Dr. Heroult, under whose able direction this comprehensive and important development will be consummated and also operated after successful completion.

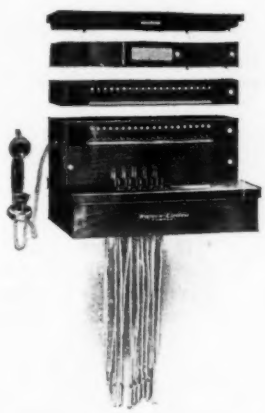
## A New Sectional-Unit Switchboard.

The necessity for private telephone systems in homes, business offices, factories, and institutions, such as schools, hospitals, prisons and asylums, is becoming more and more universally acknowledged. Intercommunication is coming to be looked upon as the most efficient way in which to get results within an organization of any considerable magnitude.



Sectional-Unit Private-Exchange Board.

The Western Electric Company has developed and placed on the market an intercommunicating switchboard—known as the No. 1801—of a distinctly unique type. It follows out the sectional-unit idea which has done so much for filing systems and libraries. The purchaser need only buy as much equipment as his present needs demand. When the business expands or



A Sectional-Unit Board Partly Unassembled.

the necessity for additional extensions arises, he can buy another section of switchboard which will fit in with those already installed.

The No. 1801 sectional-unit switchboard was developed to step in when the number of telephones exceeds 20 or is likely to exceed 20 in a short time. The units fit together like those of a sectional bookcase and by adding units it is possible to make a switchboard of 20, 40, 60, 80 or 100 lines capacity. It meets the demand for a switchboard which will be absolutely reliable while inexpensive enough to fit a modest appropriation.

One of the features which makes this board an ideal switchboard for schools, factories, prisons and other institutions is its arrangement for sounding a general alarm. This is a means of ringing and talking to all stations simultaneously, thus providing a fire or general alarm system without extra cost. Four systems, to give four different classes of service, may be furnished. Two provide a means of connecting in to the public telephone system.

## An Electrolytic Sterilizing Plant.

A recent application of electrolysis to the industrial sterilization of water has been used in a plant in England and described in *The Canadian Engineer*. At a textile mill, which is devoted to the woolen dyeing and finishing process, a supply of water is obtain from moorlands on which cattle are grazed, so that there is some slight contamination from this source; the result was formerly the rapid growth of algae in the storage reservoirs, which filled up the supply pipes. Grids were useless, as the fine silky threads lay across the grids in a felted mass which had to be removed with rakes every half-hour, and the threads thus broken and released got into the mill and on the goods, whence they were practically irremovable.

Chloride-of-lime solution destroyed the weed but hardened the water; the result was that scale formed in the boilers and curdled the soap used in the fulling and finishing of the woolens, so the use of this chemical had to be abandoned, and the weed soon reappeared. Copper sulphate was tried, and this at once affected the dyes.

Mr. Toyne, the consulting chemist, was acquainted with Samuel Rideal's investigations into the subject of water purification, wherein the use of electrolytic sodium hypochlorite was advocated, and as a last resource he tried the electrolyzer made by Ernest Grether & Company, of Manchester. After three days' trial this proved entirely successful; the weed was killed, and the water—which had previously been tinged slightly yellow, owing to the infiltration of peaty matter—was changed to the ordinary blue-green of pure river water. The proper strength of chlorine to effect the purpose was ascertained by experiment, and amounted to about two parts chlorine to 1,000,000 parts water. A couple of planks were thrown across the little stream which fed

the reservoir, and the apparatus was mounted on these, so that the electrolytic sodium hypochlorite, as made, trickled into the brook, and was thus intimately mixed with all the water that entered the reservoir. An automatic feed tank was provided at a higher elevation, and a hogshead of brine, higher still, so that, after filling the hogshead once a day, the operation of the plant was entirely automatic. A little roof protected the apparatus from the weather. Current was provided from the mill-lighting circuit at 110 volts by means of an overhead line; the current amounted to about 8 amperes, and the overflow from the electrolyzer was at the rate of one liter per minute, with a strength of 3 grams active chlorine per liter. The brine had a strength of 4 per cent.

When the amount of chlorine required had once been determined, it did its work in the reservoir, and spent itself on the organic matter therein; there was no chlorine present at the outflow. Daily chemical tests failed to show either chlorine or nitrogenous matter, and the dyes were not affected. If any free salt was present, the quantity was too small to be detected, and in any case it was harmless. The water was excellent for drinking purposes, and, in fine, the experiment was a great success from every point of view.

The subsequent development of this experiment is even more interesting; as winter set in, it was decided to stop the electrolyzer, as no growth of algae takes place in cold weather; at the end of a fortnight complaints were made of the reappearance of peculiar markings, or stains, on the material in course of treatment, which excited comment, seeing that this old trouble had been absent during an exceptionally hot summer. The bacterial action of the water was at once suspected, and the electrolyzer restarted, when the fungoid growths at once disappeared. Needless to say, instructions were issued to run the electrolyzer henceforth summer and winter.

Further experiment has shown that in winter, when the growth of vegetation is suspended, the amount of electrolytic sodium hypochlorite may be reduced to one part per million, the contaminated water thus treated refusing to show any action on gelatine plates.

The cost of working was estimated as follows: Taking the cost of energy as derived from the mill at about 5 cents per kilowatt-hour, and running the plant at 8 amperes for 10 hours a day, the consumption of energy was 8.8 units, costing, say, 44 cents a day. The brine used amounted to 132 gallons of 4-per-cent density per day, requiring 52 pounds of salt, which, at the price paid by the dye-house, cost 10 cents. The labor and attendance required was negligible, the outfit being substantially automatic.

## A Motor-Driven Radial Drill.

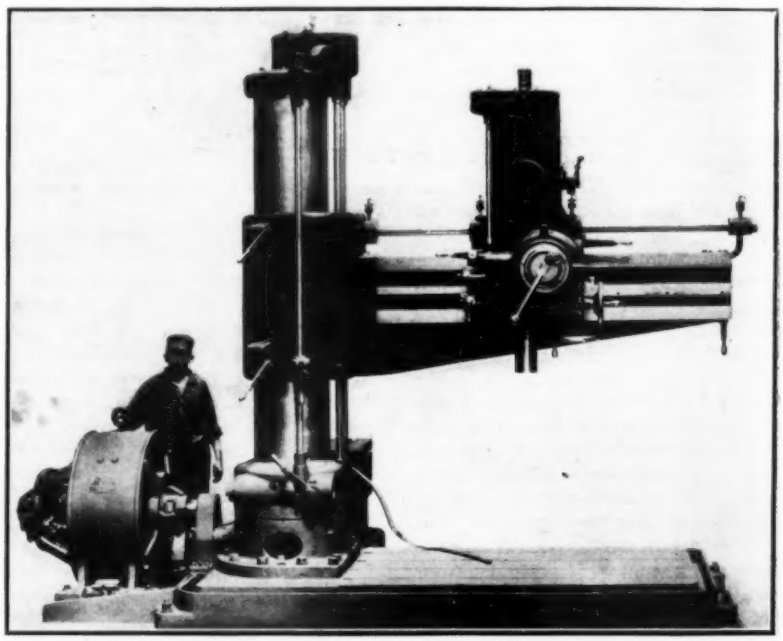
The accompanying illustration shows a high-speed, high-powered, plain radial drill that is direct-driven by an adjustable-speed electric motor. While the machine is nominally a six-foot radial drill, the arm and base may be shortened or lengthened as desired. It is designed for continuous drilling from the solid, in either cast iron or steel, holes up to three inches in diameter at the speeds and feeds recommended by high-speed drill manufacturers. Provision is made also for furnishing the machine with a pump and accessories for delivering lubrication to the point of the drill.

The arm is made in box section including the ribbing, and is so designed that it lowers at double its elevating speed, and trips automatically at the top and bottom to guard against accident. It is evenly balanced and little effort is required to swing it around. The base has an extension for a table and contains a reservoir and channels for the use of a lubricant. The bearings are bronze bushed. All the important ones are provided with adjustable sight-feed oilers. The depth gauge, which forms a part of the quick-return head and also acts as an automatic trip, is graduated to read from zero in either sixteenths or millimeters to a depth of seven inches without resetting.

The feeding mechanism is inclosed in the head and fitted with a ball thrust bearing. It affords 10 changes of feed, ranging from 0.008 to 0.04 inch, each of which is instantly available by means of a lever-operated key.

The drill has 20 speeds, any one of which may be obtained while the machine is running. Five changes of speed are obtained by means of a single lever on the speed box; the fastest speed being but 1.7 times that of the slowest.

The motor has a capacity of 20 horsepower and is designed for operation on a 230-volt direct-current circuit with a speed range of 2 to 1. It is mounted on an extension of the bed and is connected to the drill by nickel-steel gears. The motor is provided with commutating poles which assure practically sparkless commutation under all loads and at any speed within the range for which it was designed. The bearings have a liberal area; are dustproof, and are well lubricated whenever the motor operates, but no oil can escape from the bearings.



Large Motor-Driven Radial Drill.

The motor is made by the Westinghouse Electric & Manufacturing Company, and is particularly adapted to adjustable-speed machine-tool drive and other services in which the load is frequently started, stopped and reversed. The drill is manufactured by the Cincinnati Bickford Machine Tool Company, and is sold by the Brown & Zortman Machine Tool Company.

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The General Electric Company has been awarded a contract for furnishing the Mare Island Navy Yard with two centrifugal single-stage, motor-driven air compressors at $1,950; also for 5,000 feet of duplex cable, for the Brooklyn Yard at 9.6 cents per foot.

# Current Electrical News

## LIGHTING AND POWER.

*(Special Correspondence.)*

MELROSE, IOWA.—Melrose has voted in favor of electric lighting. C.

DONIPHAN, NEB.—This town has decided to install an electric light plant. C.

ARTESIAN, S. D.—Bonds have been voted for an electric light plant at this place. C.

BASSETT, NEB.—Bonds for $3,000 have been voted at this place for electric lights. C.

CLARA CITY, MINN.—Bonds have been voted for an electric light plant in this city. C.

BOONE, IOWA.—The Boone Electric Company will erect a new transformer station. C.

EDDYVILLE, KY.—This city is considering the installation of an electric light plant.

GREENVILLE, TEX.—It is stated that Wesley College intends to install an electric light plant.

MAYVILLE, N. D.—This town has decided to issue $20,000 worth of bonds for a new electric light plant.

ECHO, MINN.—The Council contemplates installing a small electric light plant to cost about $2,000. C.

IDAGROVE, IOWA.—The merchants of this place are planning to finance boulevard lighting for their city.

COGSWELL, N. D.—W. E. Johnson and H. L. Saylor have been granted a franchise for an electric light plant here. C.

LOWELL, MASS.—A "White Way" will be installed in this city extending from the City Hall to Middlesex Street Depot.

BOWDON, GA.—This city will issue bonds to the amount of $8,000 for the purpose of erecting an electric light plant.

BRECKENRIDGE, MINN.—This city has voted bonds to cover improvements to the lighting system to cost about $1,500. C.

LUVERNE, MINN.—This city has voted $10,000 for improvements to the electric light system. Day current will be provided. C.

CARPINTERIA, CAL.—Earl E. Moss is interested in a plan to erect an electric plant to supply light and power to the valley.

NORWAY, IOWA.—A franchise has been granted to the Cedar Rapids & Iowa City Electric Light Company to operate in this town. C.

CHARLESTON, S. C.—The North Charleston Water & Light Company has been granted a charter with a capital stock of $20,000.

CORYDON, KY.—This city will vote in the near future upon a bond issue to finance the installation of an electric light and power plant. G.

KILBOURN, WIS.—The Southern Wisconsin Power Company contemplates enlarging its power plant and installing a $2,000 dynamo. C.

SANFORD, FLA.—Sanford Manufacturing Company is reported to be preparing to install a small electric light plant for the town.

BURLINGTON, IOWA.—The Burlington Power Company has been granted a franchise for a power-supply plant at West Burlington. C.

BANNING, CAL.—W. E. Boden and H. S. Williamson, representing Redland capitalists, are considering putting in an electric light plant in this city.

RICH HILL, MO.—This city has voted to issue bonds in the amount of $15,000 for the purpose of extending and improving its electric light system.

RICHMOND, VA.—Atlantic Power & Light Corporation has ben chartered with Ernest Flippen as president and H. H. Chalkey, secretary-treasurer.

GILMAN, ILL.—A 30-year franchise to operate an electric light plant has been granted by the City Council to the Union Central Electric Company.

DEKALB, ILL.—An ornamental lighting system will be installed on Main Street. The City Council will furnish $1,600 and the Commercial Club, $3,200. Z.

ANNANDALE, MINN.—W. H. Towle is president of the new electric light company and G. G. Sawyer, manager. C.

FLORENCE, COLO.—A committee of the City Council has in hand the matter of a municipal lighting plant with a view to establishing an electric light system here.

BELLEVILLE, N. J.—The Common Council has authorized a contract with the Public Service Electric Company for the installation of arc lights on Washington Avenue. A.

SPARTANSBURG, S. C.—It is reported that J. B. Carlisle, J. H.Shores, P. B. Lankford and associates will build a hydroelectric plant about five miles distant from this city.

CRESCO, IOWA.—The Interstate Power Company has bought the Freehoff electric light plant, and will string transmission lines from its power dams to operate this system. C.

GREENFIELD, IND.—The Town Board and County Commissioners, it is reported, will shortly let the contract for the installation of a cluster-light system in this city.

RIVERSIDE, CAL.—Mayor William Peters and Engineers Burns and McDonald have been investigating the feasibility of installing an electric lighting plant on the Baldwin site.

PENNINGTON, VA.—Pennington Light Company has been incorporated with a capital stock of $5,000. J. H. Legg is president and R. L. Wood, secretary and treasurer of the company.

AUSTIN, TEX.—The Southwestern Gas & Electric Company of Wilmington, Del., which has a capital stock of of $2,500,000, has been authorized by the Secretary of State to operate in Texas. Z.

MARSHALL, ILL.—C. G. Hallauer, of Arcola, proposes to erect an artificial ice and cold storage plant here, and furnish power to the water-pumping station, and also furnish electricity for the city. Z.

FISHERVILLE, VA.—The Staunton Lighting Company, Staunton, Va., will install an electric system to supply light and power to this city. W. F. Ficklen, Jr., Staunton, is general superintendent.

MADRID, N. Y.—Madrid Electric Light Company has been incorporated with a capital stock of $6,800. The incorporators are Abner D. Whitney, Lucy M. Whitney and Frederick J. Merriman, all of Madrid.

RISING SUN, IND.—The Rising Sun Water & Light Company has been incorporated with a capital stock of $45,000 to furnish water, light and power. The incorporators are C. R. Green, J. W. Whitlock and L. Harris. Z.

ADAMS, TENN.—The Beech Valley Milling Company has engaged S. M. McMurray, of Nashville, to draw plans for a concrete dam and spillway which it will erect here for the purpose of generating hydroelectric power. G.

ATLANTA, ILL.—S. B. Robinson, manager of the Electric Light Company, has closed a contract with the Village Board at McLean to light the village streets and has also been given a franchise to sell electricity in the village. Z.

HASTINGS, MICH.—A bond issue of $120,000 is under consideration here for the purpose of making improvements to the municipal plant and building a dam on the river for making electric current for the municipal lighting and pumping plants.

NOETHVILLE, MICH.—It has been announced that the town will build a new water wheel and put in a new 75-kilowatt generator in the spring to furnish light and power. S. Wilkinson, superintendent of the water works, has the matter in charge.

CHARLESTON, W. VA.—The New River Power Company has been incorporated with a capital stock of $200,000 for the purpose of manufacturing power from the waters of the New River. The incorporators are J. N. Miller, Wilbur Tusch, Joseph O'Brien, Dawson C. Glover and W. L. Nossaman, all of New York.

GAINESVILLE, FLA.—J. C. Cook and H. W. Loving, representatives of the J. B. McCrary Company, the Atlanta concern which has the contract for securing data on the cost of con-

structing a municipal lighting plant and extension of the waterworks system, have been making investigations in this field preparatory to making their report.

GUTHRIE, OKLA.—Bernard Flexner, representing a big utilities company, has taken over the holdings of Thomas P. Smith in the Guthrie Light & Power Company. The stockholders then elected Mr. Flexner president of the company and George Otis Spencer, secretary. The new management has decided to make many improvements to the plant.

HILLSBORO, ILL.—The Hillsboro Electric Light & Power Company will increase its capital stock to $500,000 and change the name of the company to the Central Illinois Utilities Company. Transmission lines will be constructed from Hillsboro to Greenville, touching Coffeen and Donnellson, and later another line will be built to Fillmore. A contract has been closed with the Village Board at Coffeen to light the streets there. Z.

LESLIE, ARK.—The Leslie Light & Power Company has been organized with a capital stock of $50,000 for the purpose of furnishing light and power for Leslie. The directors are Ed Moys, W. C. Leonard, E. W. Montriae, H. L. Leonard and Joe C. Miller. This is a reorganization of the old Ice Plant Light Company. Work of remodeling the old plant with up-to-date electrical power machinery will begin immediately.

COLUMBIA, S. C.—The Parr Shoals Power Company will construct a hydroelectric plant on the Broad River. The ultimate installation will include 2,000-kilowatt main units, of which eight main units and both exciters will be put in immediately upon completion of plant. A steel-tower double-circuit transmission line will be built to Columbia, probably operating 66,000 volts. J. G. White & Company, New York City, are the engineers and contractors.

PORTLAND, ORE.—As soon as the work of harnessing the waters of the White Salmon River has been accomplished it is stated that the Klickita River will be harnessed for 30,000 more horsepower, and the Lewis River will furnish 50,000, thus making a great system to furnish cheap power for the lower part of the Columbia Valley. Rates for the service have not yet been fixed, as the promoters are still negotiating with the city officials for a franchise, but it is expected that the price will be much lower than that now ruling.

MANCHESTER, TENN.—Sites for power dams near here have been purchased by the Stone Fort Power Company, which is now completing its organization. The sites are at Big Falls and Little Falls, respectively, and the company will develop hydroelectric power from up-to-date plants which are to be installed. The Little Falls plant will be completed within three months, according to preparations which are now being made. A number of contracts have already been closed by the new Manchester power company for furnishing current in that vicinity, and in time a number of neighboring towns will be included in its connections. John Chumbley, H. T. Bown and W. G. Cummings are the organizers. G.

## TELEPHONE AND TELEGRAPH.

*(Special Correspondence.)*

HENRIETTA, MINN.—A telephone line is projected to Grasston. Elmer Nyquist is interested. C.

TEKOA, WASH.—William Anderson has been granted a 10-year franchise for a telephone system in this city.

CONCRETE, WASH.—The Skagit River Telephone Company plans to extend its lines to Marblemount.

MOORE'S HILL, IND.—The Chesterville & Moore's Hill Telephone Company has been incorporated with a capital stock of $180. Among the incorporators are W. A. Wheeler and Burt Marshall.

WAUSAU, WIS.—Farmers Eastern Telephone Company has been incorporated with a capital stock of $5,000. The incorporators are W. W. Albers, Nathan Heimemann, James Montgomery and E. B. Thayer.

SOUTH PASADENA, CAL.—As soon as the engineer for the company can determine the wire center of the Pasadena Sunset and Home telephone lines in this city a site for a substation will be purchased.

HARRISON, N. J.—The Common Council has granted the New York Telephone Company permission to install underground conduits on Harrison Avenue, First, Second, Third and Seventh, and Washington Streets. A.

JACKSONVILLE, FLA.—The Home Telephone Company has been incorporated with a capital stock of $1,325,000. Charles Blum is president and A. S. Metzner is secretary of the new company. The plan is to build a 100-mile telephone system.

PORT ARTHUR, TEX.—The South Texas Telephone Company is planning to make improvements to its present system, including a new exchange with modern switchboard, etc. It is also planned to place the wires and cables underground.

EPHRAIM, UTAH.—The City Council has in prospect building long-distance telephone lines between Mount Pleasant and Ephraim and a committee is now preparing plans and specifications for the approval of the council. These will be submitted to the bidders and the recorder will advertise for bids in accordance with the plans adopted.

MAYFIELD, KY.—The plant of the Jimtown Telephone Company, extending from Mayfield through the Northwestern section of that county, has been purchased by J. M. Gossett, who will improve the exchange and provide toll connections with the lines of the Central Home Telephone Company, of Louisville, through that section. G.

## ELECTRIC RAILWAYS.

*(Special Correspondence.)*

BILLINGS, MONT.—The street car company will build the Montana Avenue extension. C.

EAU CLAIRE, WIS.—The Council is considering better street lights and a "White Way" for the business section.

EL SEGUNDO, CAL.—The Pacific Electric Railway Company has put a body of men in the field to complete the purchase of a right of way between this city and Hawthorne.

TULSA, OKLA.—It is stated that financiers of this place are planning an interurban line to connect Wichita Falls with the Electra oil fields.

SUPERIOR, WIS.—The town of Superior has granted a franchise to the Superior Steel Plant Traction Company for a trolley line from South Superior to the St. Louis River bridge.

MIAMI, ARIZ.—The board of supervisors has granted a franchise for the construction of an interurban electric railway to run between Miami and Globe to M. N. Amnster, of Boston, Mass. D.

CAMPBELLSBURG, IND.—J. H. James has been awarded a 25-year franchise for the operating of an electric lighting plant in this city. Contracts will be awarded as soon as plans are made. S.

GOWANDA, N. Y.—F. E. Bard of this place is interested in the proposed trolley line to connect Falconer and Hamburg. It is reported that work of surveying the line is to be started at once.

STRATFORD, ONT.—It is reported that Sir William Mackenzie has definitely decided to build a street railway in this city and has instructed his associates to work out the best possible arrangements and terms. Engineer Rothery has charge of the matter.

LONG BRANCH. N. J.—The Jersey Central Traction Company will soon commence construction on a new line between this city and Red Bank, by way of Little Silver, a distance of about 10 miles. Franchise for the work has been granted. A.

SAN JOSE, CAL.—It is reported that big railroad interests are behind a project to build an electric railway from Saratoga to the Big Basin, the California Redwood Park. The report has it that the Commercial Clubs in the Valley are interested.

COALGATE, OKLA.—The City Council has granted two electric railway franchises to D. Padrick, of Coalgate, and William Oglesby, of McAlester. They were unanimously adopted and will be voted upon by the voters of the city at the general election in November. P.

MOUNT VERNON, N. Y.—The Public Service Company has granted permission to the Hudson & Eastern Traction Company, of which Francis A. Stratton, of this place, is president, to issue $806,000 in bonds and the work of constructing the new cross-country trolley line will be started at once.

COLUMBIA, MO.—The Mexico, Perry & Santa Fe Electric Railway Company is reported to be planning the immediate extension of its road from Mexico toward Hereford, and also to Columbia and Fulton. It is stated that the company has a franchise to run over some of the streets of Columbia.

CHARLESTON, S. C.—The Charleston-Summerville Interurban Railway Company has been organized with J. L. David as president, and E. W. Hughes, secretary. It is understood that arrangements are well matured for launching the enterprise; that rights of way have all been acquired and that construction work will soon be started.

SHREVEPORT,- LA.—The Texas Louisiana Traction Company has been incorporated with a capital stock of $3,500 to operate an interurban electric car line between Shreveport, Longview, Marshall and Jefferson, Tex., or any two of the Texas points and Shreve-

port. J. K. Bivens is president and A. B. Blevens, secretary of the company.

TEMPLE, TEX.—The Southern Traction Company, which is constructing an interurban electric railway between Dallas and Waco with a branch line to Corsicana, contemplates enlarging these plans, making Temple the southern terminus of the main line. If this is done it will necessitate the construction of an additional 33 miles of road. D.

KINGSVILLE, O.—The Conneaut, Kingsville & Ashtabula Railway Company has been incorporated with $25,000 capital stock. Raymond C. Thompson, William E. Hawley and Charles E. Hawkins are the incorporators of the new enterprise, which will build an electric railway from Conneaut to Ashtabula and operate an electric light and power house in connection with same.

TRENTON, N. J.—The Trenton & Elizabeth Railroad Company and the Riverside Traction Company, which together form one of the most important links in the through-trolley service between Jersey City and Camden, have issued bonds in the amount of $300,000 and $250,000, respectively, for the purpose of establishing a more direct trolley connection between New York, Trenton and Philadelphia, *via* Camden.

AUSTIN, TEX.—It is stated by J. V. Watkins, of Dallas, who is president of the Trinity Valley Traction Company, that his company has succeeded in financing the projected interurban electric railway between Dallas and Austin, a distance of about 235 miles. The route for the proposed line is *via* Waxahachie, Hubbard City, Marlin, Cameron, Taylor and several smaller towns. Construction work will be started before January 1, 1913. D.

COLLEGE STATION, TEX.—O. E. Gammill, manager of the interurban line between College and Bryan, has presented a proposition to the Agricultural and Mechanical College to convert its system into an electric system provided the college people will take half of the stock necessary for the improvements. It is estimated that the cost of this project will be about $22,000 and a committee has been appointed to solicit subscriptions of stock.

BLUE RAPIDS, KANS.—It is stated that some parties interested in the dam and electric plant at this place are planning to greatly enlarge the size of the dam to be in a position to produce much more power, and to this end are promoting an electric interurban out east and south of Blue Rapids down into May Day Township, following Fancy Creek down to Winkler, or a little farther to the north, Otter Creek, and then along that creek and back toward Blue Rapids. This would traverse a rich section of country that has hitherto been without a railroad.

PONTIAC, MICH.—George C. Webber, of Linden, is credited with the statement that right of way has been secured for an electric road from Holly to Owosso and that the line will be extended from Holly to Pontiac. The company has water power at Argentine, Byron, Linden and Holly and expects to develop sufficient power for lighting the towns through which the road will run. O. H. Lau, of Detroit, who promoted the Detroit, Rochester, Romeo, Lake Orion and Flint road, has become interested in the project and it is claimed that the road will be a reality.

TERRELL, TEX.—The East Texas Traction Company, which was organized to construct an interurban electric railway between Dallas and Terrell, is negotiating for the sale of its survey and other holdings connected with the project to the Stone & Webster Engineering Corporation of Boston. If the deal is consummated the construction of the line will soon be started. The East Texas Traction Company at one time held options on a right of way for nearly the entire route, but many of these options have expired and will have to be renewed if the road is built. The proposed line will be about 30 miles long and will traverse a very thickly settled portion of the state.

## PROPOSALS.

ELECTRIC PASSENGER ELEVATORS.—Sealed proposals will be received at the office of the Supervising Architect, Washington, D. C., until November 1 for electric passenger elevators in the post offices at San Diego, Cal., and Bellingham, Wash.; until November 4 for an electric passenger elevator, installed complete, in the United States Marine Hospital, Chicago, Ill.; until November 18 for the installation complete of an electric passenger elevator in the post office at Missoula, Mont. Copies of drawings and specifications may be had from the custodians of the various sites or from the office of the Supervising Architect.

ELECTRIC CONDUITS AND WIRING AND INTERIOR LIGHTING FIXTURES.—Sealed proposals will be received at the office of the Supervising Architect, Washington, D. C., until November 27 for the electric conduits and wiring and interior lighting fixtures of a one-story building for the post office at Beloit, Kans.; until November 29, of a two-story extension of the post office at Lincoln, Neb.; until December 5 of a two-story building for the post office at Lewis, Del.; until December 9 of a one-story building for the post office at Auburn, N. Y.; until December 14 of a one-story building for the post office at Defiance, O. Copies of drawings and specifications may be obtained from the custodians of the various sites or from the office of the Supervising Architect.

## NEW INCORPORATIONS.

OGDEN, UTAH.—Electric Service Company has been incorporated with a capital stock of $10,000 by George W. Barlow, Charles Hartley and Joseph Willard Barlow.

WEST LAFAYETTE, IND.—The Electric Time & Manufacturing Company has been incorporated with a capital stock of $10,000. The directors are Albert E. Bradbury, Charles R. Moore and Horace W. Asire. Z.

LIBBY, MONT.—Libby Supply Company has been incorporated with a capital stock of $20,000 by Lewis E. Throop, William E. Reed and A. M. Hoffman. The company will deal in hardware and electrical supplies.

SPRING VALLEY, ILL.—Depue Electric Company has been incorporated with a capital stock of $50,000 for the purpose of operating gas and electric plants. The incorporators are Constant Brown, Charles H. Brown, Roy W. Brown and Harry E. Brown.

ROCHESTER, N. Y.—Electric Car Sales & Service Company has been incorporated with a capital stock of $10,000 to deal in electrical motor vehicles and equipment. The incorporators are Max Bernstein and Minnie L. Bohrer, of Rochester, and Glenn H. Leaty, Webster, N. Y.

BOSTON, MASS.—The firm of James W. Poole, Incorporated, has filed articles of incorporation with a capital stock of $50,000 to deal in electrical supplies. James W. Poole, Alfred E. Poole, Mary E. Poole, Benjamin F. Haines and William J. Miller are named as the incorporators. C.

## NEW PUBLICATIONS.

ELECTROTECHNICAL COMMISSION.—The third annual report of the International Electrotechnical commission has been issued. This covers the year ending December, 1911, and contains principally matters which have already received publication through other channels, including the action at the Turin meeting.

SULPHUR CONTENTS OF FUELS.—The Bureau of Mines, Washington, D. C., has issued technical paper No. 26 which has been prepared by Irvin C. Allen and J. W. Robertson, and gives a brief summary of the effects of sulphur in fuels, particularly in petroleum products, and discusses various methods of sulphur determination.

HAMILTON, ONTARIO.—An attractive illustrated book describing the advantages of Hamilton, Ont., as a manufacturing city has been prepared under the direction of H. M. Marsh, Commissioner of Industries, City Hall, Hamilton, from whom copies may be obtained. The book shows many views in and about the city, particularly of its manufacturing plants, which represent some 400 different industries. A classified list of manufacturers is included and also an excellent map of the city.

SMOKE INVESTIGATION, UNIVERSITY OF PITTSBURGH.—The Department of Industrial Research of the University of Pittsburgh has issued an outline of the comprehensive smoke investigation now being conducted by a staff of 25 specialists. Among the subjects being taken up are the relation of smoke and the weather, the chemistry of smoke and soot, the physical problems of smoke, what the smoke nuisance costs, who makes the smoke laws and ordinances concerning smoke, general experimental work, waste and inefficiency of smoke, education of the public, and legal regulations.

ELECTRIC POWER FROM THE MISSISSIPPI RIVER.—The Mississippi River Power Company, Keokuk, Iowa, has isued Bulletin No. 7, with the foregoing title. This publication, like its predecessors, gives very interesting views of the progress of this great hydroelectric power undertaking. This particular bulletin covers the period from June to September of this year. Among the illustrations are several showing the progress on the great dam on which the construction work has now been practically completed; there are also several views in the power house, in the tail race, the lock, and some bird's eye views showing the general aspect of the entire undertaking.

## FINANCIAL NOTES.

Except for a semi-panicky feeling developed in the stock market last week due to the Balkan crisis and the lowering of the war cloud, the developments were highly favorable. The most recent crop reports forecast an approximate yield beyond the most sanguine expectations. The total money value of the country's principal crops is estimated as being between $9,000,000,000 and $10,000,000,000. The improvement in the railway situation is attracting considerable attention; the gross tonnage now being transported by the country's transportation lines is reaching record proportions, but thus far the railroads have prevented any serious freight congestion due to lack of cars. The car shortage, however, is steadily increasing, and this presents an adverse problem that has to be considered. In conjunction with the great improvement in internal trade our foreign trade is establishing new high records. The improvement includes many classes of raw material, as well as finished products.

The Reorganization Committee of the Allis-Chalmers Company, of which James N. Wallace is chairman, has prepared a statement of the business and operations of the company up to August 31 last. It shows profits (after deducting cost of operation and maintenance and depreciation) for June of $25,642; July, $66,984, and August, $48,471. The average monthly sales billed during those months are in excess of the average of the first five months by 17 per cent. The average monthly orders booked for the last three months are in excess of the average for the first five months by 64 per cent.

On December 31, 1911, the unfilled orders were $3,453,085; May 31, 1912, $3,689,506, and August 31, 1912, $5,195,669. The committee also announces that the receiver, Otto H. Falk, advises that overhead, administration and selling expenses have been reduced by an average of about $40,000 a month as compared with several years past. The receiver also makes a statement as of August 31, 1912, showing current assets of $9,526,954, of which $1,480,798 is cash. The total liabilities are given as $2,198,779, leaving a surplus of $7,328,175, which is $198,000 in excess of the surplus reported by the company on December 31, 1911.

The Canadian General Electric, Limited, has secured control of the Allis-Chalmers-Bullock Company, manufacturers of dynamos and other electrical machinery. The Allis-Chalmers-Bullock Company has a large plant at Rockfield, a suburb of Montreal.

The Edison Sault Electric Company has called for payment at 105 at the Standard Trust Company on November 1, all of its outstanding $350,000 first-mortgage five-per-cent bonds, due 1925.

Brooklyn Rapid Transit gross for three months to October 1 gained but $115,000 or at the rate of $460,000 per annum, comparing with $1,239,908 or 5.5 per cent increase for year to June 30 last. Poor weather was the main factor.

Hodenpyl, Hardy & Company, New York, have paid to the stockholders of the Springfield (O.) Light, Heat & Power Company $1 per share as a guarantee that the firm intends to exercise its option and purchase control of the company. The original agreement was that control would be bought if 80 per cent of the stock could be secured. Thus far 95 per cent of the outstanding preferred and 86 per cent of the common has been deposited for sale. The purchasers have until November 16 to complete the transaction and to make arrangements for financing the new property.

The Trenton & Elizabeth Railway Company, which operates the trolley line between the cities named, filed a certificate with the Secretary of State showing that it has issued and sold $300,000 of first-mortgage bonds. The Riverside Traction Company, which operates the trolley line between Trenton and Camden, also filed a certificate showing that it has issued $250,000 of bonds. The two lines form a link in the through trolley service between Philadelphia and New York.

The New England Telephone & Telegraph Company has sold to Kidder, Peabody & Company, Boston, $10,000,000 20-year-debenture five-per-cent bonds. The indenture to the Old Colony Trust Company provides that if any mortgage shall be placed on the property these bonds shall be ratably secured thereby, and that the company shall have at no time outstanding an amount of bonds greater than the par value of the company's outstanding capital stock. Proceeds of this issue will be used to pay off the present floating indebtedness and provide for extensions and improvements in the company's service during the year 1913.

Stock control of the Burlington (Wis.) Electric Light & Power Company has been sold to the Milwaukee Electric Railway & Light Company. The price paid for the controlling interest is in the neighborhood of $100,000. The Milwaukee company has not purchased the property of the Burlington company, but merely control. It is understood that the result of this sale is that the Burlington company will be furnished with its power by the Milwaukee company. The consideration paid for the stock was fixed by the engineers of the Wisconsin Railroad Commission. The Burlington Electric Light & Power Company was established in 1888 and has been operated by the late owners for about 15 years.

Protracted litigation over losses of United States Independent Telephone Company at Rochester, N. Y., has been settled through agreement of defendants to pay $1,500,000 or about 58 per cent of investors' losses. Money will be contributed by directors who include George Eastman, Hiram Sibley, Henry A. Strong, Thomas W. Finucane, James S. Watson, estates of Eugene Satterlee and Albert O. Fenn, all of Rochester; William H. Page, of New York, and estate of William F. Folker, of St. Louis.

Interborough Rapid Transit made a splendid gain in gross for its first quarter, the three months ended September 30. The increase was $435,800, at the rate of $1,750,000 per annum, which is a gain of 5.5 per cent over last year. The twelve months to June 30 last recorded the satisfactory increase in total income of $1,479,000, but at the rate the current year has started, it promises to even excel last. September gross increased $2,460 per day, or $74,000 for the month, which is materially less than the big gains of $182,000 in August and $180,000 in July. A favorable feature of current Interborough operations is that 70 per cent of the gain in gross is being saved for net.

It is expected that the General Electric Company for the year to end December 31, will show net earnings available for dividends of close to $11,500,000, which would be equal to approximately 14.8 per cent on its present outstanding capitalization, comparing with 13.6 per cent in the preceding year. These figures are based on the belief that the General Electric Company will write off for plants about the same amount as last year. Including the amount that may be written off for plants, the balance after all charges would be equal to approximately 18.3 per cent on the capital stock. Including proceeds of about $10,000,000 from the recent bond issue, and the possible balance of $5,700,000 after providing for dividends and writing off for depreciation, the General Electric Company in 1912 may show an increase in its working capital of more than $15,000,000. As a result of the recent bond issue, actual cash of the General Electric Company now amounts to approximately $22,000,000.

The board of directors of the Long Acre Electric Light & Power Company has been reorganized to consist of the following members: Pliny Fisk, A. B. Leach, P. G. Gossler, H. L. Denny, G. P. Toby, A. A. Tilney and E. W. Bell. P. G. Gossler has been elected president, H. L. Denny vice-president, and E. W. Bell, secretary and treasurer. The reorganization of the Long Acre Electric Light & Power Company with entirely new directorate and list of officials, follows the passing of stock control of the company from J. C. Sheehan and associated interests otherwise known as the Manhattan Transit Company, to the banking houses of A. B. Leach & Company and Harvey Fisk & Sons. Manhattan Transit Company formerly owned the $50,000 outstanding

CLOSING BID PRICES FOR ELECTRICAL SECURITIES ON THE LEADING EXCHANGES AS COMPARED WITH THE PREVIOUS WEEK.

| | Oct. 14. | Oct. 7. |
|---|---|---|
| American Tel. & Tel. (New York) | 143⅛ | 144¼ |
| Commonwealth Edison (Chicago) | 139¼ | 139¼ |
| Edison Electric Illuminating (Boston) | 277 | 277 |
| Electric Company of America (Philadelphia) | *12¼ | *12¼ |
| Electric Storage Battery common (Philadelphia) | 56 | 56 |
| Electric Storage Battery preferred (Philadelphia) | 56 | 56 |
| General Electric (New York) | 182¼ | 183 |
| Kings County Electric (New York) | 129 | 129 |
| Manhattan Transit (New York) | 1¼ | 1¼ |
| Massachusetts Electric common (Boston) | 20 | 19¾ |
| Massachusetts Electric preferred (Boston) | 79 | 78 |
| National Carbon common (Chicago) | 129½ | 125½ |
| National Carbon preferred (Chicago) | 119½ | 119¼ |
| New England Telephone (Boston) | 153 | 153 |
| Philadelphia Electric (Philadelphia) | 23⅛ | 23¼ |
| Postal Telegraph and Cables common (New York) | 85⅜ | 86¼ |
| Postal Telegraph and Cables preferred (New York) | 68¼ | 68⅛ |
| Western Union (New York) | 80¼ | 81⅜ |
| Westinghouse common (New York) | 83⅞ | 84½ |
| Westinghouse preferred (New York) | *122⅛ | 122½ |

*Last price quoted.

stock now owned by the bankers. Directors who have been superseded follow: George E. Bouchie, J. C. Sheehan, James F. Shaw, W. R. Sheldon, O. B. Corbin, W. M. Gulick and W. K. Knight. The old officers were J. F. Shaw, president; J. C. Sheehan, vice-president; and O. B. Corbin, secretary and treasurer. Representatives of the banking houses assert that the company will now go ahead with its plans of development, but first will have to clear up many details. The company can complete no financing pending the decision of the Court of Appeals in the case carried to it from the Appellate Division of the Supreme Court by attorneys for the New York Edison Company.

### Dividends.

Binghamton Light, Heat & Power Company; a quarterly dividend of 0.75 per cent on the common stock, payable October 15 to stock of record September 30; 1.5 per cent on the preferred stock payable October 15 to stock of record September 30.

Electric Bond & Share Company; regular quarterly dividends of 1.5 per cent on the preferred stock and two per cent on the common stock. Preferred dividend is payable November 1; common dividend, October 15.

Havana Electric Railway, Light & Power Company; a semi-annual dividend of $3 on the preferred stock and a dividend of $2.25 on the common stock, both payable November 16 to stock of record October 26.

Houghton County Electric Light Company; semi-annual dividend of 75 cents per share on preferred and 2.5 cents per share on common stock, payable November 1 to stock of record October 16.

Sayre Electric Company; a quarterly dividend of 1.5 per cent on the preferred stock, payable October 15 to stock of record September 30, and one per cent on the common stock, payable October 15 to stock of record September 30.

United Electric Securities; a semi-annual preferred dividend of $3.50 per share, payable November 1 to stock of record October 18.

### Reports of Earnings.

CONNECTICUT COMPANY.

The annual report of the Connecticut Company, the big 782-mile trolley merger of the New Haven Railroad system in Connecticut, shows net earnings of $2,918,321, against $2,327,839 in 1911. The income account compares as follows:

| | 1912 | 1911 |
|---|---|---|
| Total operating revenue | $8,030,620 | $7,615,065 |
| Total operating expenses | 5,112,299 | 5,287,225 |
| Net operating revenue | 2,918,321 | 2,327,839 |
| Outside operations | 62,541 | 148,415 |
| Total net revenue | 2,980,862 | 2,476,254 |
| Taxes | 449,247 | 418,727 |
| Operating income | 2,531,615 | 2,057,527 |
| Interest, rent, etc. | 1,012,539 | 939,464 |
| Surplus | 1,519,073 | 1,118,063 |

PORTLAND RAILWAY, LIGHT & POWER.

The Portland Railway, Light & Power Company reports to the New York Stock Exchange for the year 1911 and six months ended June 30, 1912:

| | Year 1911 | Six mos. ended June 30, '12 |
|---|---|---|
| Gross receipts | $6,336,703 | $3,252,617 |
| Net earnings | 3,607,074 | 1,885,457 |
| Charges and taxes | 1,850,548 | 1,151,353 |
| Surplus | 1,756,526 | 734,104 |
| Dividends | 1,000,000 | 500,000 |
| Balance | 756,526 | 234,104 |
| Repairs and renewals | 285,981 | 96,984 |
| Surplus | 470,545 | 137,120 |

## PERSONAL MENTION.

N. T. GUERNSEY, of the law firm of Guernsey, Parker & Miller, Des Moines, Iowa, has been appointed counsel for the American Telephone & Telegraph Company, with headquarters in New York City.

E. H. WITCRAFT has resigned as electrical inspector for the Underwriters Association of the Middle Department to become general manager of the Fayette Electrical Engineering Company, Connellsville, Pa.

DAVID W. FYE has resigned the presidency of the United States Light & Heating Company, of New York City, and has been succeeded by V. Allen Smith, who now is both president and general manager of the company.

KERN DODGE, the well known engineer of Philadelphia, Pa., has returned from a year's travel abroad and announces the opening of an office in the Morris Building, Philadelphia, where he will devote himself henceforth to the engineering and financing of public-service properties. Mr. Dodge was one

Kern Dodge.

of the founders and for many years one of the partners of the engineering firm, Dodge & Day. His new offices are in the suite with the banking firm of William A. Read & Company.

HOWARD JOSLYN, city electrician of Seattle, Wash., spent several days of this week in Chicago. Mr. Joslyn made Chicago one of the cities at which he stopped in a tour of inspection of the operation of electrical departments in various large cities.

MORGAN W. MAGHEE has been appointed superintendent of the Consolidated Power & Light Company, Lead, S. D., succeeding C. W. Hough, who will take up his residence in Europe and act as agent abroad for J. C. Clarke Company, of New York.

GEORGE A. GILFILLAN, acting geenral manager and consulting engineer of the Morris County Traction Company, Morristown, N. J., has resigned with that company to accept a similar position with the Black River Telephone Company, with headquarters at Lorain, O.

R. H. McLAIN of the Power Engineering Department of the General Electric Company spent October 12 in Chicago. Mr. McLain, whose headquarters are at Schenectady, N. Y., was returning from Duluth, Minn., where he had spent two weeks supervising the installation of a large coal-hoisting plant.

FRANK KOESTER, consulting engineer, has removed his office from 115 Broadway to larger quarters at 50 Church Street (Hudson Terminal Building), New York. Mr. Koester is principally engaged in steam and hydroelectric power-plant work, electric transmission and traction. He recently finished the plans for a central asphalt repairing plant of 3,000 square yards daily capacity, for which he was retained as an expert by the Borough of Manhattan, New York City.

## OBITUARY.

GEORGE E. MALM, vice-president of the Electrical Manufacturing Company, Cleveland, O., died October 5 as the result of grieving over the death of his father, which occurred three weeks previous. Mr. Malm is survived by his widow, mother, three brothers and two sisters.

HENRY CHARLES HEPBURN, the oldest telegrapher in the world, died at his country home in West Islip, aged eighty-six years. Mr. Hepburn was a native of Rochester, and became interested in telegraphy, in its infancy. He helped install the first telegraph instrument set up west of the Alleghenies and sent the first message from Pittsburgh. He also helped install the first line from Philadelphia to Washington. Later he drifted into Wall Street, where he had a seat in the Stock Exchange for a number of years. He retired six years ago. His death was due to pneumonia. He leaves a wife, one son, and a daughter.

## DATES AHEAD.

The 1912 Boston Electric Show. September 28 to October 26.

Association of Railway Electrical Engineers. Annual convention, Chicago, Ill., October 21-24.

Illinois State Electrical Association. Annual convention, Peoria, Ill., October 22-24.

Old Time Telegraphers' and Historical Association and the Society of the United States Military Telegraph Corps. Annual convention, Jacksonville, Fla., October 22-24.

Indiana Electric Light Association. Annual convention, Indianapolis, Ind., October 30 and 31.

Electrical Supply Jobbers' Association, Hot Springs, Va., November 13-15.

Association of Telephone Pioneers of America. Annual convention, New York City, November 14-15.

Alabama Light and Tractıon Association. Birmingham, Ala., November 14-15.

American Mining Congress. Fifteenth annual meeting, Spokane, Wash., November 25-28.

American Society of Mechanical Engineers. Annual meeting, New York, N. Y., December 3-6.

American Institute of Chemical Engineers. Annual meeting, Detroit, Mich., December 4-6.

American Association for Advancement of Science and affiliated societies. Annual meeting, Cleveland, O., December 30-January 4, 1913.

Electrical Contractors' Association of New York State. Annual meeting, Syracuse, N. Y., January 21, 1913.

Western Association of Electrical Inspectors. Annual meeting, St. Louis, Mo., January 28-30, 1913.

# With the Electrical Manufacturers

**Edison Storage Battery Company,** Belleville, N. J., has taken out a building permit for a new factory-building addition to its plant, 35 by 114 feet, to cost about $6,000.

**Standard Underground Cable Company,** Pittsburgh, Pa., has issued a unique folder shaped like a sample trunk and in which are some 18 sample views of its conductor terminals, cable end bells, and various forms of cable junction boxes.

**Crocker-Wheeler Company,** Ampere, N. J., has issued two new bulletins, Nos. 155 and 156. The first of these is devoted to Form Q induction motors for operation on 60-cycle polyphase circuits. The second bulletin deals with motor-generator sets for all purposes. Each bulletin is well illustrated, describes the parts of the machinery and shows a few uses of these machines. Their advantages are carefully pointed out.

**Columbia Incandescent Lamp Works of General Electric Company,** St. Louis, Mo., has appointed Walker & Kepler, a well known electrical contracting firm of Philadelphia, as its agents for Philadelphia and surrounding territory. The large stock and complete distributing organization maintained by Walker & Kepler insure maximum efficiency and promptness in handling all orders for Columbia lamps.

**Nelite Works of General Electric Company,** Cleveland, Ohio, has issued a booklet describing Veluria reflectors for commercial service. This type of glassware meets many commercial lighting problems wherein both artistic effect and efficiency are of equal importance. This glass is a light opal with small absorption and is particularly serviceable for high-grade fixtures were a soft, mellow light is desired.

**Westinghouse Electric & Manufacturing Company,** East Pittsbugh, Pa., reports the following orders among those recently received; C. D. Park Company, Palmer, Mass., one 1,250-kilowatt, three-phase, 60-cycle, 2,300-volt turbogenerator with 25-kilowatt, 125-volt turbogenerator set for use as an exciter, and one switchboard for the control of this equipment; Cincinnati Traction Company, Cincinnati, O., 26 double equipments of No. 318 railway motors and type K-40-A control; Michigan United Traction Company, Jackson, Mich., 20 quadruple equipments of No. 333B-2 motors for 600-1,200-volt operation and type HLF control.

**Benjamin Electric Manufacturing Company,** Chicago, has issued catalog B-20. In this 80-page book are described and illustrated the large variety of wireless clusters and lighting specialties manufactured by this company. Among these are cluster boxes, plug clusters, weatherproof fixtures, pendent fixtures, ceiling fixtures and car clusters, various special fixtures for industrial use and store, office and street lighting. There are also mentioned the well-known Benjamin lighting specialties such as attachment plugs, current taps, adapters, socket clusters, lock guards, lamp grips, special sockets, etc. The concluding portion of the book is devoted to fixture accessories and the new friction-drive screw drivers. Copies of this catalog may be obtained on request to the company.

**Moloney Electric Company,** St. Louis, Mo., has recently received orders for "High Efficiency" Moloney transformers from the Columbia Quarry Company, St. Louis, Mo.; Centralia Gas & Electric Company, Centralia, Ill.; Alta Bert Gold Dredging Company, San Francisco, Cal.; Brush Electric Company, Galveston, Tex.; Fearson Engineering Corporation, New York, N. Y.; East St. Louis & Suburban Railway; Ft. Dodge, Des Moines & Southern Railway; Menominee Range Power & Railway Company; Cedar Rapids & Iowa City Railway & Light Company; Rio de Janeiro Tramway, Light & Power Company; Farmington Light & Power Company; Mexican Light & Power Company, Ltd.; Richmond Electric Company; A. Kinser Construction Company, St. Louis, Mo. These transformers range in size from 25 to 250 kilowatts and in voltage up to 22,000 volts on the high-tension side.

**The Electric Storage Battery Company,** Philadelphia, Pa., has issued a bulletin describing some interesting uses of storage batteries. This is illustrated and shows installations of various types of the company's batteries as used by electric light and power companies in central-station service, by electric railway companies for power plants and substations, for propelling street cars, electric pleasure cars and commercial trucks, for yacht illumination, for lighting and ignition in motor boats, for lighting, ignition and self-starting in gasoline automobiles, for electric lighting plants for farms and country homes, for operating electric lights, elevators and motors in large office buildings, for furnishing the current for telephone and telegraph exchanges, for operating switch and signal systems, for operating wireless telegraph apparatus, for running submarine boats and for gun firing in the navy, and for lighting steam-railway trains.

**General Electric Company,** Schenectady, N. Y., reports that among its recent orders for power plant, substation and machine-driving equipment are the following: Americans Falls Power Company, American Falls, Idaho, a 3,750-kilowatt water-wheel-type generator with 50-kilowatt exciter, also a 50-kilowatt motor-generator set, four 1,250-kilowatt transformers and switchboard; Turner Falls Company, Turner Falls, Mass., a 1,500 kilowatt generator, a 400-kilowatt two-unit motor-generator set and switchboard; Youngstown Sheet & Tube Company, Youngstown, O., a Curtis turbogenerator of 4,375-kilowatt capacity and three motors of 300, 500 and 550 horsepower rating; Aluminum Company of America, Niagara Falls, N. Y., a 2,000-kilowatt rotary converter and three 735-kilowatt transformers; Simonds Manufacturing Company, Fitchburg, Mass., 47 motors, ranging from 0.5 to 35 horsepower; E. & G. Brooke Iron Company, Birdsboro, Pa., 25,000-cubic-foot multi-stage blast-furnace blower set; Union Iron Works, San Francisco, Cal., 49 motors ranging from 5 to 20 horsepower; Pittsburgh Crucible Steel Company, Pittsburgh, Pa., one 500-kilowatt and one 3,125 kilowatt Curtis turbogenerator; United Iron Works, Joplin, Mo., 26 motors ranging from 1 to 35 horsepower with necessary transformers and switchboard; Griffin Wheel Company, Kansas City, Kans., 28 motors ranging from 5 to 100 horsepower with transformers and switchboard.

# Record of Electrical Patents.

## Issued by the United States Patent Office, October 8, 1912.

**1,040,257. Interlocking Tubular Construction.** F. Barr, New York, N. Y. Means for locking the cap and outer shell of a socket.

**1,040,271. Winding Mechanism for Spring Motors.** T. J. Bounimovitsch, Wilna, Russia. An electric motor is arranged to wind the spring of a talking machine.

**1,040,289. Electric Preheater for Pilot Burners.** A. Doble, assignor to H. A. Doble, Brookline, Mass. Has a heating coil in the fuel pipe.

**1,040,292. Electric Controller.** A. C. Eastwood, assignor to Electric Controller & Manufacturing Co., Cleveland, O. Includes a set of relay-controlled electromagnetic contactor switches.

**1,040,303. Theatrical Apparatus.** J. W. Frakes, Chicago, Ill. Permits an actress to walk upside down along a series of vacuum cups controlled by an electric valve.

**1,040,309. Switching Device.** D. D. Gordon, Chicago, Ill. A push-button-actuated set of contact-making and insulating balls alternately make and break the circuit between two terminals projecting into the runway.

**1,040,315. Graphite Brush.** W. H.

Hardman, assignor to General Electric Co. Contains about 98 per cent of graphite and 2 per cent carborundum.

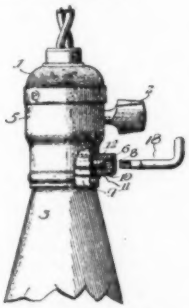
**1,040,331. Detachably Mounting a Fuse Formed with Terminals or Contacts of Knife-Blade Type.** B. D. Horton, Detroit, Mich. The pressure between the contact clips is adjustable.

**1,040,333. Filament Support.** J. W. Howell, assignor to General Electric Co. The leading-in wires have knife edges to which the tungsten-filament ends are electrically welded.

**1,040,339. Motor-Controlling Apparatus.** J. D. Ihlder and W. D. Lutz, assignors to Otis Elevator Co., Jersey City, N. J. An ordnance apparatus in which, when one motor raises the breech of the gun, the torque of the ammunition-carrier motor is automatically increased.

**1,040,349. Ignition System.** C. F. Kettering, assignor to Dayton Engineering Laboratories Co., Dayton, O. Includes a rotary distributor and means for dissipating the inductive current in the non-active spark plugs.

**1,040,359. Electric Controller.** J. A. Latimer, Youngstown, O. The needle of an indicator can close the solenoid circuit at either end of a reciprocating valve-actuating plunger.



1,040,366.—Lamp-Locking Socket.

**1,040,366 and 1,040,367. Lamp-Locking Device.** J. C. Manley, J. Thulin and P. J. Smith, assignors to Inventors Development Co., Chicago, Ill. Has a key-controlled indenting member to bear against the lamp shell and prevent its removal from the socket.

**1,040,370. Washing Machine.** P. McDorma, assignor to National Laundry Machinery Co., Dayton, O. Has circumferential electrodes about a revolving cylinder to permit passing current through the washing fluid.

**1,040,378. Electric Signaling System.** W. L. Miller, assignor to Gisholt Machine Co., Madison, Wis. Includes a rotary switch blade and lamp signal for an automatic machine.

**1,040,379. Process of Treating Nitric Acid by Electrolysis.** M. Moest and R. M. von Berneck, assignors to Farbwerke vorm. Meister Lucius & Brüning, Höchst-on-the-Main, Germany. Consists in passing a current through an electrolyte of nitric acid to a cathode of graphite.

**1,040,381. Panel-Board Construction.** E. S. Morrell, Philadelphia, Pa. Includes removable units each comprising a switch and fuse.

**1,040,389. Electric Signaling Device.** R. C. Nevin, Berkeley, Cal. A desk telephone has an automatic calling device comprising a circuit-making and breaking piston in the standard controlled by raising a finger plate.

**1,040,412. Light-Reflector for Automobile Lamps.** C. Reichl, Milwaukee, Wis. A socket-bearing hub is adjustably and yieldingly secured to the center of the reflector.

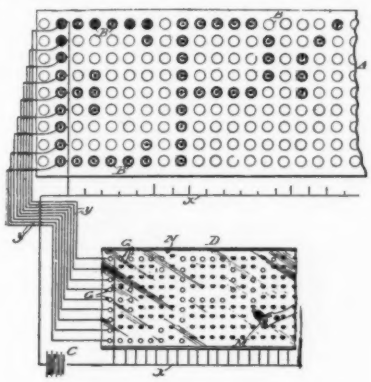
**1,040,418. Method of Joining Metals.** A. F. Rietzel, assignor to Thomson Electric Welding Co., Lynn, Mass. Electric welding of sheet metal by means of a coupling piece pressed over the joint.

**1,040,428. Device for Aiding the Hearing.** E. W. Schneider, assignor to Mears Ear Phone Co., New York, N. Y. A special way of mounting a telephone transmitter on the end of a dry cell.

**1,040,429. Device for Aiding the Hearing.** E. W. Schneider, New York, N. Y. A means for locking the two parts of the above together.

**1,040,440. Breaker for Electric Circuits.** F. L. Sessions, Columbus, O., assignor to Jeffrey Manufacturing Co. A multipolar circuit-breaker with magnetic blowout.

**1,040,452. Support for Electric Translating Devices.** B. A. Stowe, assignor to Adams-Bagnall Electric Co., Cleveland, O. An adjustable bracket for a wall fan.



1,040,475.—Changeable-Letter Sign.

**1,040,455. Electric-Switch Contact.** L. L. Tatum, assignor to Cutler-Hammer Manufacturing Co., Milwaukee, Wis. The contact surfaces of an oil switch have opposite diagonal grooves.

**1,040,475. Electric-Light Display System.** H. E. Way, Easton, Pa. A changeable-letter sign with many rows of lamps and an operating board for controlling their circuits.

**1,040,486. Method of Desiccating.** W. H. Allen, Cleveland, O. Organic substances are dried by subjecting them to an alternating magnetic field in a cool, dry atmosphere.

**1,040,496. System of Electrical Distribution.** W. L. Bliss, assignor to United States Light & Heating Co., New York, N. Y. An axle car-lighting system which includes a counter-electromotive-force device for controlling the generator and electrolytic valves to protect this from the battery.

**1,040,518. Ignition Apparatus for Internal-Combustion Engines.** M. B. Crist and M. R. Wells, assignors to Colonial Trust Co., Pittsburgh, Pa. A make-and-break system including a mercury circuit terminal.

**1,040,526. Coin Collector.** A. F. Dixon, assignor to Western Electric Co., Chicago, Ill. An electromagnetically controlled telephone toll mechanism.

**1,040,541. Coupling for Non-Closable Circuit-Breakers.** K. Köhn, Schaffhausen, Switzerland. The operating and actuating spindles are interconnected so as to prevent closure as long as abnormal current conditions exist.

**1,040,546. Elevator Control.** J. D. Ihlder, assignor to Otis Elevator Co., Jersey City, N. J. Permits the elevator to be brought automatically to or near any floor and allows the motor to give slight additional movements to the car.

**1,040,553. Means for Controlling the Strainer Drums of Paper-Making Machines.** M. Lamort, Vitry-le-François, France. Provides electromagnetic control for the electric driving motor.

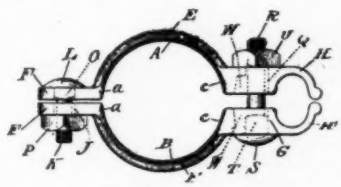
**1,040,555. Electric-Motor Mechanism for Operating Elevator Safeties.** A. Magnuson, assignor to Otis Elevator Co. A motor carried by the car applies the emergency gripping brake.

**1,040,573. Locking Device.** G. E. Palmer, Brookline, Mass. For locking and sealing a house meter.

**1,040,584. Typewriter and Other Key-Actuated Machine.** J. T. Schaaff, Washington, D. C. Is driven by an electric motor.

**1,040,585. Typewriting and Other Key-Actuated Machine.** J. T. Schaaff, Washington, D. C. A modification of the above.

**1,040,586. Automatic Electric Speed-Regulator.** M. D. Selden and R. L. Graves, Memphis, Tenn. Combined with a speedometer is a set of contact plates each controlling a lamp signal and an electric bell.



1,040,620.—Insulator Clamp.

**1,040,595. Electrically Heated Utensil.** A. A. Warner, assignor to Landers, Frary & Clark, New Britain, Conn. A special means of securing the heating unit and holder to the base of a chafing dish.

**1,040,604. Power-Transmission Gearing.** V. G. Apple, Dayton, O. An alternative chain and spur-gear connection between the dynamo and gas engine.

**1,040,620. Insulator Clamp.** W. G. Clark, New York, N. Y. A two-part clamp bolted at each side and having a pair of jaws at one end.

**1,040,626. Egg Tester.** D. B. Conway, Ft. Dodge, Ia. Includes a dry cell and miniature incandescent lamp.

**1,040,629 and 1,040,630. Telephone System.** E. R. Corwin, assignor to Corwin Telephone Manufacturing Co. Chicago, Ill. Relates to an arrangement of relays for automatically controlling the ringing circuit and for disconnecting the operator's set when connection is completed.

**1,040,631. Busy-Test for Telephone Systems.** E. R. Corwin, assignor to Corwin Telephone Manufacturing Co. Provides for an automatic and rapid test through the plug-cord circuit.

**1,040,632 and 1,040,633. Telephone System.** E. R. Corwin, assignor to Corwin Telephone Manufacturing Co.

The first patent describes a motor mechanism for intermittently sending ringing current over the called line. The second patent relates to the connection of a common battery to lines in active service.

**1,040,634. Telephone-Exchange System.** E. R. Corwin, assignor to Corwin Telephone Manufacturing Co. Relates to the method of trunking and trunk signaling.

**1,040,635 and 1,040,636. Telephony.** C. A. Bals, assignor to Corwin Telephone Manufacturing Co. The first of these patents provides an automatic selecting calling device in the base of a desk set; the second patent provides for interconnection of two stations on the same line.

**1,040,637. Telephone Transmitter.** R. Royal, assignor to Corwin Telephone Manufacturing Co. One of the electrodes is mounted on a flexible closure to the transmitter cup.

**1,040,680. Trolley Wheel.** H. Holland, Cleveland, O. Has flat-sided arms between the hub and rim.

**1,040,691. Plate-Printing Machine.** G. H. Kendall, New York, N. Y. Includes electric heating devices for uniformly heating the plate.

**1,040,704. Automatic Electric Regulator.** H. Leitner, Woking, England. Provides automatic resistance control for the lamp circuit and for the field of a variable-speed dynamo.

**1,040,715. Centering Device.** H. Mann, Brooklyn, N. Y., assignor of one-fourth to C. Thoma, Jr., and one-fourth to W. Thoma. Includes a miniature lamp and switch for controlling it.

**1,040,760. Electric Chain-Welding Machine.** A. F. Rietzel and G. E. Barstow, assignors to Thomson Electric Welding Co., Lynn, Mass. The clamping and current-applying jaws are operated through a power shaft, controlled by a clutch and treadle; this patent has 191 claims.

**1,040,762. Protective Covering for Attachment Plugs.** M. R. Rodrigues, New York, N. Y. Each part of a separable two-part plug is incased in a tough body covering.

**1,040,771. Rear Indicator for Vehicles.** W. H. Sammons, Philadelphia, Pa. Includes an electromagnetically controlled semaphore and two electric direction-indicating lamps, the chauffeur being able to throw the semaphore to either side or to light either lamp.

**1,040,789. Trolley.** H. Shaffert, East Pittsburgh, Pa. Has a retaining member on each side of the harp.

**1,040,796. Telephone-Receiver Holder.** S. C. Sladden, New York, N. Y. Permits the receiver to be swung and held to the user's ear.

**1,040,800. Safety Attachment for Boilers.** W. P. Smith, Locust Grove, Va. The gauge contains a float adapted to close the alarm circuit between two points.

**1,040,801. Inhaling Mask.** J. W. Snyder, Michigan City, Ind. Includes an electric coil for heating the anesthetic.

**1,040,810. Motor Suspension.** K. E. Stuart, Philadelphia, Pa. Relates to the mounting for a car motor.

**1,040,818. Electric Furnace.** O. Vogel, Wilmersdorf, Germany. A resistance furnace for melting quartz and glass.

**1,040,830. Sectional Electrode.** A. M. Williamson, assignor to International Acheson Graphite Co., Niagara Falls, N. Y. Is composed of several sections of graphite joined by a graphite connector of finer grain, greater strength and conductivity.

**1,040,862. Automatic Adjustment for Reelers.** G. H. Blaxter, assignor to Pittsburg Seamless Tube Co., Beaver Falls, Pa. Regulating means for electrically driven rolls are controlled in synchronism with the variations in the current supply.

**1,040,863. Overload Control for Metal Rolls.** G. H. Blaxter, Beaver, Pa. Includes a flywheel, motor and clutch and means for disconnecting the rolls at the clutch when an excessive load occurs.

**1,040,867. Driving Mechanism for Portable Drills or Similar Tools.** J. A. Bradley, Pittsburgh, Pa., assignor of one-half to H. C. Digby. The motor shaft is connected to the tool spindle through reducing gears.

**1,040,883. Circuit-Closer.** C. A. Castle, Oldham, S. D. Contacts carried by a movable spindle engage a set of fixed contacts.

**1,040,884. Automatic Spark-Advancer.** C. C. Charles, Hoisington, Kans. The speed of the shaft governs the shifting of a contact on the timer casing.

**1,040,904. Trolley Guard.** S. C. Distefano, Baltimore, Md. Has a guard arm on each side of the trolley harp.

**1,040,919. Egg-Testing Machine.** S. J. Fish, Jackson, Mich. A slidable circuit-closer on a movable egg holder can close the lighting circuit for a sight aperture.

**1,040,923. Electroplating Appliance.** J. A. Fraser, Benton Harbor, Mich. Relates to the method of mounting the electrodes in the tank.

**1,040,927. Electric Safety Device for the Flowing Out of Excess Voltage.** G. Giles, Fribourg, Switzerland. Consists of a series of electrode rings and insulating rings with a metallic rod through them and connected to only one electrode, thus forming a set of condensers.

**1,040,932. Sign.** A. Gray, New York, N. Y. Has a metallic background and a coat of metal electrodeposited around the sides of the letters and border.

**1,040,934. Casing for Electric Fans.** A. Gregory, Wytheville, Va. A casing with an ornamental face surrounds the motor and fan blades.

**1,040,937. Combination Gas-Burner and Electric Gas-Igniter.** H. D. Grinnell, Pittsfield, Mass. Wires imbedded in the tube connect with electrodes on opposite sides of the burner.

**1,040,940. Art of Railway Signaling.** W. Grunow, Jr., Waterbury, Conn., assignor to American Railway Signal Co. An electric block-signal system.

**1,040,941. Circuit-Closing Device or Switch for Use in Connection with Electric or Other Railways.** W. Grunow, Jr., assignor to American Railway Signal Co. A normally open signaling circuit is closed against the tension of a spring.

**1,040,943. Light Fixture.** P. J. Handel, Meriden, Conn. An oil lamp with shade also carries electric incandescent lamps beneath the shade.

**1,040,971. Insulating Joint.** C. Wirt, Philadelphia, Pa., assignor to Wirt Electric Specialty Co. An outer casing has insulation within it and between the two internal threaded shells.

**1,040,975. Suspension Insulator Clamp.** W. G. Clark, New York, N. Y. Each clamp has a grooved body and a suspension device at one end.

**Reissue.**

**13,475. Fitting for Electric Conduits.** W. C. Robinson, Pittsburgh, Pa. Original No. 971,216, dated Sept. 27, 1910. A connecting block for joining a branch circuit to a sectional conduit.

**Patents That Have Expired.**

Following is a list of electrical patents (issued by the United States Patent Office) that expired October 15, 1912.

547,783. Conduit System for Electric Railways. J. Hartman, Philadelphia, Pa.

547,784. Supply System for Electric Railways. J. Hartman, Philadelphia, Pa.

547,834. Electrical Transmission of Power. W. D. Baldwin, Yonkers, N. Y.

547,835. Electric Car-Lighting Apparatus. W. Biddle, Brooklyn, N. Y.

547,847. Combined Electrical and Mechanical Brake. J. R. Cravath, Chicago, Ill.

547,873. Switch or Cross-Over System for Electric Railways. H. M. Brinckerhoff, Chicago, Ill.

547,891. Apparatus for Placing Electric Cables. E. S. Reid, New York, N. Y.

547,897. Electrical Succession Signaling or Calling System. J. G. Smith, New York, N. Y.

547,900. Fire Alarm. E. A. Speer, Toledo, O.

547,914. Series Electric Railway. O. B. Finn, Philadelphia, Pa.

547,930. Coupling for Electromotors. F. Marburg, Jr., Buffalo, N. Y.

547,942. Electrical Succession Signaling or Calling System. J. G. Smith, New York, N. Y.

547,960. Telephone System and Cable. J. W. Marsh, Pittsburgh, Pa.

547,979. Electric Heater. G. H. Whittingham, Baltimore, Md.

548,027. Telephone Attachment. C. H. Bernhard, Cleveland, O.

548,028. Electric Arc Lamp. C. Beseler, Jersey City, N. J.

548,032. Supply System for Electric Railways. H. V. Brown, Brooklyn, N. Y.

548,036. Incandescent Electric Lamp. S. E. Cox, Cleveland, O.

548,038. Thermo-electric Generator. H. B. Cox, Hartford, Conn.

548,070. Electric Railway System. J. La Burt, Brooklyn, N. Y.

548,126. Electrical Illumination. D. McF. Moore, New York, N. Y.

548,127 and 548,128. Electric Lighting System. D. McF. Moore.

548,129. Method of Electrical Illumination. D. McF. Moore.

548,130. Regulation of Electrical Phosphorescent Illumination by Magnetic Induction. D. McF. Moore.

548,131. Apparatus for Generating Phosphorescent Electric Light. D. McF. Moore.

548,132. Phosphorescent Electrical Illumination by Oscillation. D. McF. Moore.

548,133. Phosphorescent Electric Illumination by Intermittent and Permanent Interruption in Vacuum. D. McF. Moore.

548,134. Electrical Illumination by Phosphorescent Flame. D. McF. Moore.

548,150. Electrical Gold and Silver Extractor. A. Williams and W. R. Phillips, Seattle, Wash.

548,162. Combined Diaphragm and Electrode. J. Hargreaves, Farnworth-in-Widnes, and Thomas Bird, Liverpool, England.